KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

VOLUME I – FINAL OUTPUTS

November 2020

This Volume I contain the following Final Outputs:

- Output 1.1A and 4.1A - Complementary Surveys
- Output 1.1B and 4.1B - Transport Modelling
- Output 1.2 and 4.2 - Fare Structure
- Output 1.3 - Red Line Financial Modelling
- Output 1.4 - Red Line Operational Plan
- Output 1.5 and 4.5 - Business Model
- Output 2.1A and 5.1A - Red and Yellow Lines Negotiations with Existing Operators
- Output 2.1B, 2.2, 5.1B e 5.2 - Red and Yellow Lines Fleet Scrapping Plan
- Output 2.3 and 5.3 - Bus Procurement - Annex A
- Output 2.3 and 5.3 - Bus Procurement - Annex B
- Output 2.3 and 5.3 - Bus Procurement - Annex C
- Output 2.3 and 5.3 - Bus Procurement - Annex D
- Output 2.3 and 5.3 - Bus Procurement - Annex E
- Output 2.3 and 5.3 - Bus Procurement - Annex F
- Output 2.3 and 5.3 - Bus Procurement – Letter
- Output 2.3 and 5.3 – Commercial Concession Agreement
- Output 2.3 and 5.3 - Operator Contracts - Annex A
- Output 2.3 and 5.3 - Operator Contracts - Annex B
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- Output 2.3 and 5.3 - System Control and Service Provider - FMA
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- Output 2.3 and 5.3 - System Control and Service Provider - Section 8 - Appendix 1
- Output 2.3 and 5.3 - System Control and Service Provider - Section 8
- Output 2.3 and 5.3 - System Control and Service Provider - Section 9
- Output 2.5 and 5.5 - Set Up of BRT Operating Company
- Output 4.3 - Yellow Line Financial Modelling
- Output 4.4 - Yellow Line Operational Plan

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BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

Output 1.1a & Output 4.1a – Red & Yellow Line – Complimentary Surveys

July 2018

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

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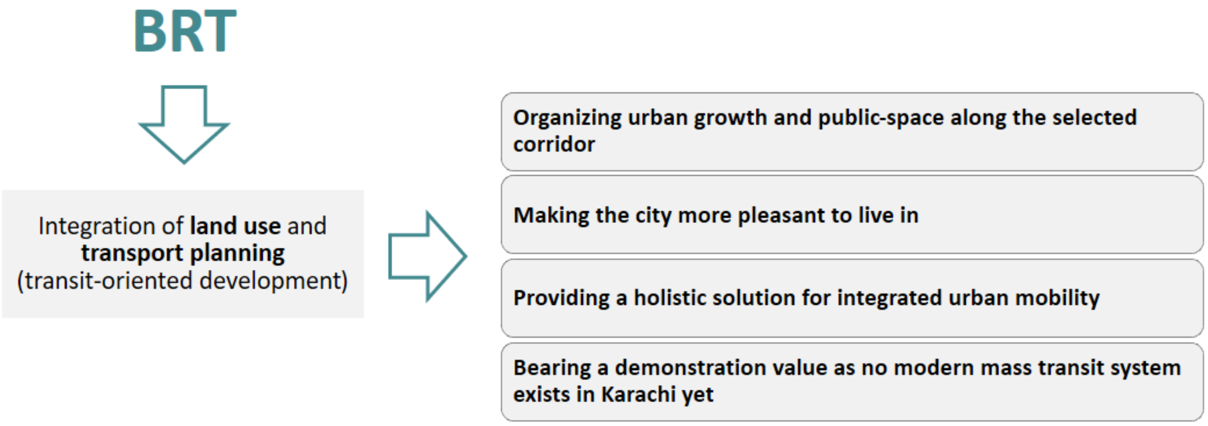
1. Introduction

Traffic Surveys are considered to be the essence of Traffic / Transport Planning and hence special emphasis has been given to this aspect of the study as all the outcomes will be based on these surveys. This report outlines the types of traffic surveys conducted, methodology adopted to execute each type of survey and the outcome of these surveys. These surveys were essential to set forth the optimized operational parameters for both On & Off Corridors in the city of Karachi. It also provides all the detailed information related to the field surveys, its rationale, and methodology and scheduling of each type of survey.

1.1. Project Objectives

The project will contribute to develop a Sustainable Urban Transport System in Karachi through the delivery of a BRT corridor, focusing on accessibility and people’s mobility. It will contribute to make Karachi more livable and safer on account of green urban infrastructure, and will boost private sector investment.



BRT

Integration of **land use** and **transport planning** (transit-oriented development)

Organizing urban growth and public-space along the selected corridor

Making the city more pleasant to live in

Providing a holistic solution for integrated urban mobility

Bearing a demonstration value as no modern mass transit system exists in Karachi yet

Figure 1.1: Objectives

1.2. Karachi main problems and challenges

Karachi is the commercial capital and industrial hub of Pakistan. The city consists of 5 districts, 6 cantonments, and areas administered by federal and provincial governments' land-holding agencies such as Defence Housing Authority (DHA), Lyari Development Authority (LDA), and Malir Development Authority (MDA) etc. The city covers an area of approximately 3,527 km2, resulting in very high population density in certain parts of the city1.

Karachi is one of the largest and most populous metropolitan cities in the world with built-up areas comprising about 1,500 km2 and an estimated population of around 27.6 million people by 2020 as per KSDP 2020. This population is estimated to grow at a rate of 3.54% p.a. as per JICA KTIP 2030, the population is expected to be 31.6 million by 2030. This would rank Karachi as the one of the biggest city of the World.

However, the city lacks a proper public transport system and commuting around the city is a major challenge. The public transport availability in the last decade has not been able to keep pace with increasing population and the share of public transport has actually fallen due to insufficient investment and interest in this sector.

Significant investments in the development of road infrastructure have also not been able to address the traffic problem in the city adequately. Hence, TMTD is aggressively pursuing plans for improving and upgrading the public mass transit system in the city.

Karachi Mass Transit Study (KMTS) in 1990 resulted in an adoption of a 20-year Mass Transit Plan for Karachi. It consisted of 87.4 km network of transit ways in six major corridors of Karachi, in addition to recommendations for immediate reforms in bus transit sector, institutional and training needs.

The first priority corridor was, however, accepted to be developed as a Light Rail Line (LRT). Despite major efforts, the implementation did not materialize due to various externalities.

Recent, efforts have been concentrated more on BRTS planning studies and revitalization of Karachi Circular Railways (KCR). The Karachi Strategic Development Plan (KSDP2020) adopted by the City District Government of Karachi (CDGK) recommended Rail Mass Transit (RMT) and BRTS to comprise the future network for urban transport mobility.

KSDP 2020 described 16 objectives for the transport sector, among which following are linked with this project:

- Provide safe and efficient mobility for people and goods.
- Improve public mass transportation system, targeting affordability and convenience.
- Strengthen existing transportation infrastructure and services by considering various alternatives.
- Minimize single-occupancy vehicle use.
- Evolve a comprehensive transportation plan development and modelling to address vehicular traffic, public mass transportation (bus line and rails based), parking to provide for development of roadway and public transport/mass transit infrastructure development priorities for long range.
- Seek improvements through strong private sector participation.
- Formulate strategy for management and operation of local bus terminals.

JICA carried out a detailed study for Karachi Transportation Improvement Project (KTIP) in 2009-2012 and recommended a comprehensive Urban Transport Master Plan that integrates roads and Mass Transit projects.

KTIP study recommends two Mass Rapid Transit (MRT) line (Blue and Brown) and six BRT lines (Green, Red, Yellow, Orange, Aqua, and Purple) besides revitalization of KCR on modern lines. The planned Mass Transit Corridors and the BRT Line route alignment are illustrated below:

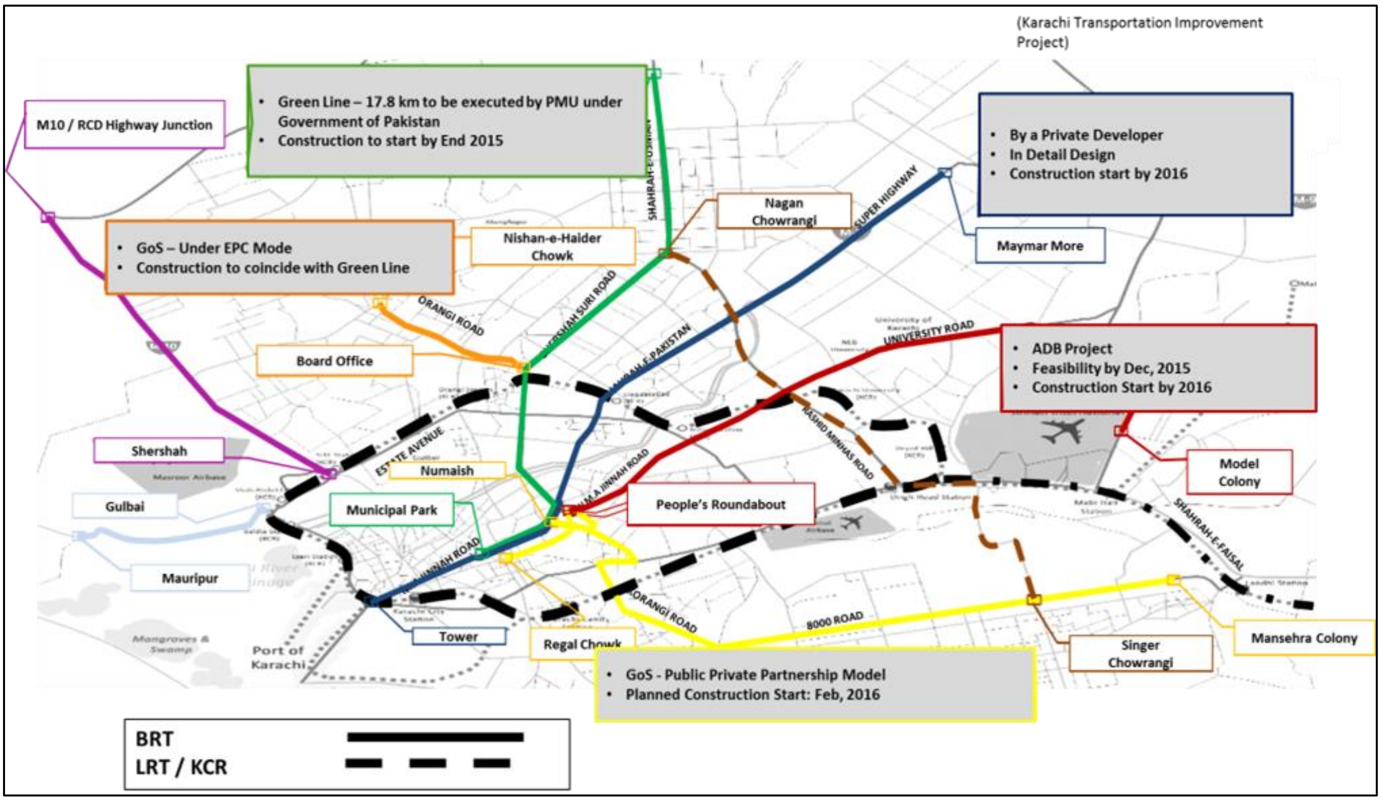


Figure 1.2: Mass Transit Corridors and the BRT Line route alignment

The share of public transport has reduced during the last decade due to insufficient investment in the sector. This has resulted in a shift of demand from public transport towards other modes of transport, such as motorcycles/private vehicles and informal Chingchi Rickshaws, despite the increase in petroleum prices. As per JICA's Person Trip Study, 2005, Karachi's public transport makes up only 4.5% of the total vehicle fleet but serves about 42% of the passenger demand, and yet it does not have dedicated lanes or any other feasible traffic management solution. However, private vehicles are 36% of the total vehicular traffic but carry only 21% of the passengers.

Through a number of studies, it has been established that the existing public transport system cannot serve the existing and incremental demand in an effective manner and there are a number of problems associated with the system including unnecessary travel delays, severe traffic congestion, economic and financial losses and environmental problems.

Daily commuters face problems due to poor quality of service, sub-standard vehicles and clumsy routes. Also, environmental degradation due to noise and air pollution and vehicular exhausts is touching alarming levels in the city.

1.3. Reconnaissance Survey

Senior Team Members of the consortium conducted a series of reconnaissance surveys for the entire study area several times to obtain on site relevant information about traffic, its circulation and various operational aspects. Photographs of various features were also captured during these surveys which ultimately helped in planning of traffic surveys and finalization of location for each type of survey. Various land uses along the BRT Corridors were observed and junctions and the control types (i.e. signalized or un-signalized) were also observed. All this information was then taken into consideration while designing the type of surveys, survey forms as well as their scheduling.

1.4. Rationale for Field Surveys:

Field surveys are the essence of the entire study. A detailed discussion follows in a separate chapter of Field Survey. However, some basic facts about rationale behind this section of methodology are being discussed here.

Keeping this in consideration, the locations or sectors on which field surveys are to be conducted required diligent attention. Therefore, prior to conducting the surveys, the list of surveys mentioned in the TORs as well as in the Inception Report were closely examined, on the basis of which it was found that the all mentioned field surveys could be divided into two broad categories mentioned below:

- ✓ **Location Based Surveys**
- ✓ **Route Based Surveys**

In all, there were 12 field surveys conducted, out which 7 were ‘location-based’ and other 5 were ‘route-based’.

Table 1.1: Field Survey Type

S. No.	Types of Survey	Category
1.	Road Network Inventory Survey	Route Based
2.	Volume Count & Occupancy Survey	Location Based
3.	Existing Bus Route Mapping	Route Based
4.	Public Transport Frequency Survey	Location Based
5.	On Board Origin & Destination Survey	Route Based
6.	Boarding & Alighting Survey	Route Based
7.	Public Transport User Interview Survey	Location Based
8.	Stated Preference Survey (Public Transport)	Location Based
9.	Stated Preference Survey (Private Vehicles)	Location Based
10.	Signal Assessment Survey	Location Based
11.	Travel Speed Survey	Route Based
12.	Existing Public Transport Sector Survey	Location Based

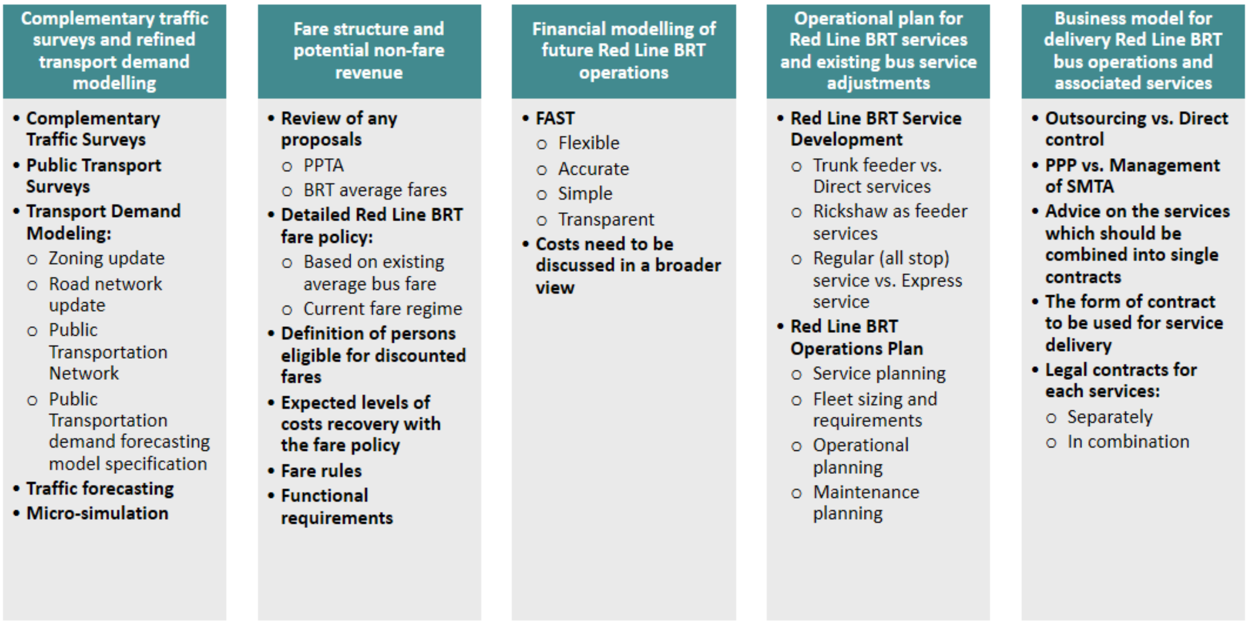
1.5. Output 1: BRT Operations Business Plan

Primarily, the BRT Operations Business Plan (BOBP) will check the bus routes arrangement under the "direct services" concept considering all the routes indicated in the Conceptual Design.

The database, zoning system and network will start from former studies. Zones and network were analyzed, and adjusted for the objectives. We are considering the need to split zones in order to represent with more precision the demand on BRT stations.

To obtain a better public transportation matrix, surveys on existing bus routes will be very important.

The BOBP will consider the following items.



Complementary traffic surveys and refined transport demand modelling

- **Complementary Traffic Surveys**
- **Public Transport Surveys**
- **Transport Demand Modeling:**
  - Zoning update
  - Road network update
  - Public Transportation Network
  - Public Transportation demand forecasting model specification
- **Traffic forecasting**
- **Micro-simulation**

Fare structure and potential non-fare revenue

- **Review of any proposals**
  - PPTA
  - BRT average fares
- **Detailed Red Line BRT fare policy:**
  - Based on existing average bus fare
  - Current fare regime
- **Definition of persons eligible for discounted fares**
- **Expected levels of costs recovery with the fare policy**
- **Fare rules**
- **Functional requirements**

Financial modelling of future Red Line BRT operations

- **FAST**
  - Flexible
  - Accurate
  - Simple
  - Transparent
- **Costs need to be discussed in a broader view**

Operational plan for Red Line BRT services and existing bus service adjustments

- **Red Line BRT Service Development**
  - Trunk feeder vs. Direct services
  - Rickshaw as feeder services
  - Regular (all stop) service vs. Express service
- **Red Line BRT Operations Plan**
  - Service planning
  - Fleet sizing and requirements
  - Operational planning
  - Maintenance planning

Business model for delivery Red Line BRT bus operations and associated services

- **Outsourcing vs. Direct control**
- **PPP vs. Management of SMTA**
- **Advice on the services which should be combined into single contracts**
- **The form of contract to be used for service delivery**
- **Legal contracts for each services:**
  - Separately
  - In combination

Figure 1.3: Output 1 – BRT Operations Business Plan

Based on the discussion above traffic surveys are now discussed in detail to understand the importance and specifications of each type of survey.

1.5.1. Output 1.1: Complementary Traffic Surveys and Refined Transport Demand Modelling

1.5.1.1. Complementary Traffic Surveys

The Consultant has considered that the traffic surveys undertaken under the main junctions and roundabouts along the corridor were enough for analysis and will do the traffic forecasting as required by the TOR.

The Consultant will give advice on forecasts of the turning movements for future design years taking account of the proposed changes in public transportation services. The forecasts will serve as basis to permit the development of the timing plans for the traffic signals at these junctions and ensure that the geometric layout can accommodate future traffic flows. For this purpose, the Consultant will carry micro simulations of the key junctions.

2. TRAFFIC SURVEYS

2.1. Public Transport Surveys

According to the TOR, surveys of bus routes were undertaken in the PPTA project; however, the depth and breadth of these surveys and the extent to which they were useful in estimating demand for the system are unclear.

To determine the current transport system demand, the Consultant conducted a detailed review of the Origin-Destination data, public transport records, transport plans and traffic studies and surveys. It is ensured that all this information was provided in original format.

These data provided a solid basis for the future survey design and data needs, as well as, an understanding of the current trip patterns for private/taxi, public, freight and non-motorized modes.

The Consultant reviewed in detail the current transport infrastructure supply and operations. This included the road network, its capacity and conditions and the current parking supply and cost structures. The Consultant also evaluated the current bus routes, their respective fleets, frequencies and any existing travel time surveys. It was important to gather information from the Government and from the main operators.

All the information on road and public transportation network was verified and coded into a geographic information system (GIS) database, thereby updating and improving the existing model.

A key element in the comprehensive demand analysis is travel pattern data. Reliable data is important to both model calibration and eventual projections. Based on the quality of the existing data and the collection dates, as well as, time constraints, the Consultant consider conducting various surveys indicated below and level of detail necessary.

The Consultant selected the survey locations, concentrating the surveys along the proposed BRT Corridor and principal intersecting routes. In addition, the Consultant potentially selected additional locations outside the immediate influence area based on high concentrations of bus routes, a large number of transfers from bus routes or rickshaws, or where existing data sources indicate high demand. List below shows the types of surveys that were conducted in the due course of the study.

Table 2.1: Types of survey

S. No.	Types of Survey
1.	Road Network Inventory Survey
2.	Volume Count & Occupancy Survey
3.	Existing Bus Route Mapping
4.	Public Transport Frequency Survey
5.	On Board Origin & Destination Survey
6.	Boarding & Alighting Survey
7.	Public Transport User Interview Survey
8.	Stated Preference Survey (Public Transport)
9.	Stated Preference Survey (Private Vehicles)
10.	Signal Assessment Survey
11.	Travel Speed Survey
12.	Existing Public Transport Sector Survey

Details for each type of survey, is mentioned in the subsequent section of this report.

2.2. Road Network Inventory Survey

The GPS-based route condition survey was conducted for route alignments of BRT Red Line & Yellow Line. The survey focused on gathering existing situation on the routes being surveyed. The information gathered include:

- Segment length
- Number of lanes
- Side lanes & clearances
- Road-side encroachments
- On-street parking
- Number of Designated Bus Stops on each Segment

The survey was carried out by breaking each route into a number of segments. Segment breakpoints existed wherever there is a change in characteristic in the features of the route e.g. at intersections, start and end points of bridges and underpasses, points of changing lane numbers, etc.

The coordinates of each breakpoint would be determined from the handheld GPS device and the segment length was noted down through the odometer of the vehicle. All information gathered were used to build a GIS database for routes and their conditions for better analysis and ultimately it will result in the Highway & Transit Network.

Table below shows major roads of BRT Corridor.

Survey Form
Survey forms are attached in the Appendix A.

Survey Locations
Table below shows major roads for both On & Off Corridor routes.

Table 2.2: Major roads for inventory surveys for BRT Red Line

Sr.No.	Road Name
1.	University Road from Safoora Chowrangi to Jail Chowrangi
2.	New M. A. Jinnah Road From Jail Chorangi to Mazar e Quaid

Table 2.3: Major roads for inventory surveys for BRT Yellow Line

Sr.No.	Road Name
1.	Korangi Industrial Area Road from Dawood Chorangi to KPT Flyover
2.	Korangi Road from KPT Flyover to FTC Interchange
3.	Shahrah-e-Faisal from FTC To Nusery
4.	Shahrah-e-Quaideen from Nursey to Numiash

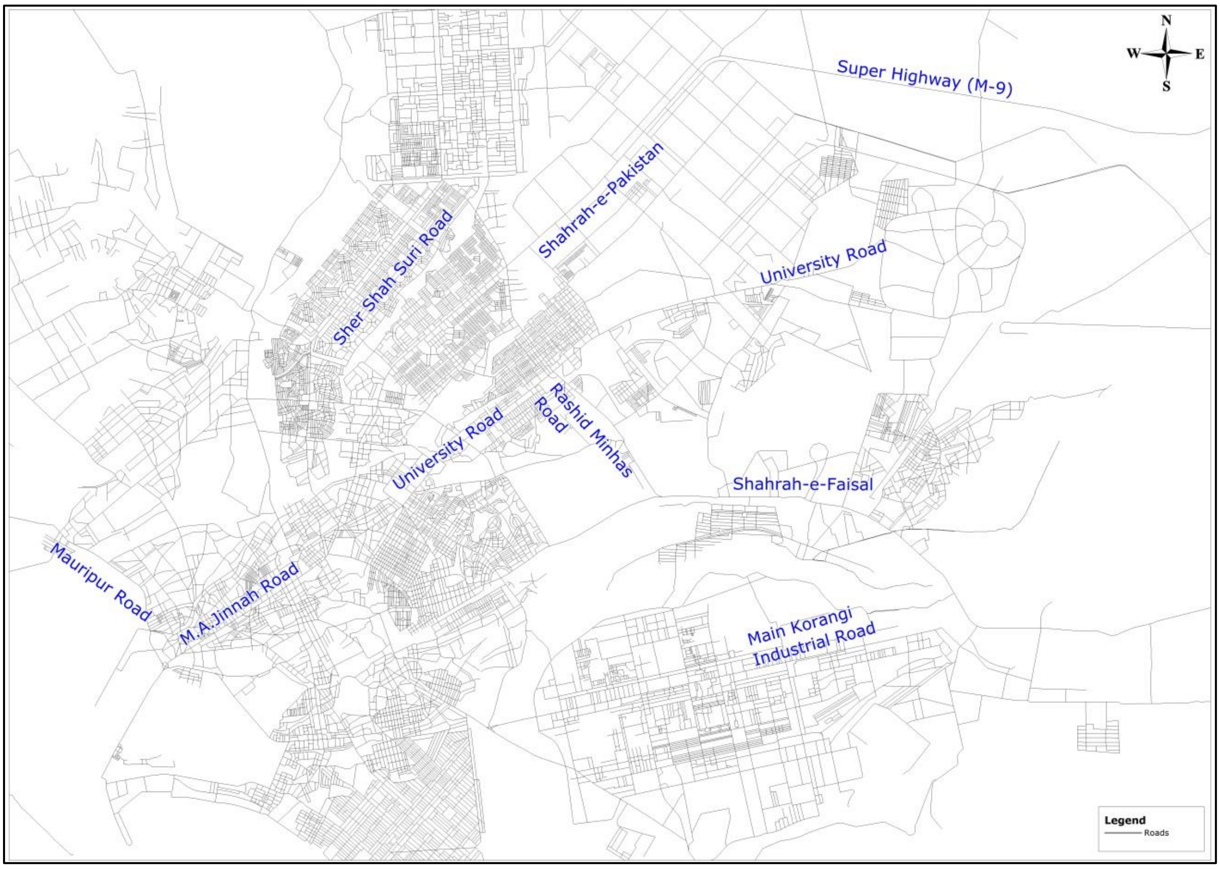


Figure 2.1: Existing road network of Karachi City

2.3. Volume Count & Occupancy Survey

The mid-block volume count & occupancy surveys were supposed to be conducted at forty-four (44) locations falling under three (3) categories i.e. 1 day 3 hours morning peak (0700 hrs to 1000 hrs), 3 days 15 hours (0700 hrs to 2200 hrs including 1 weekday and 2 weekend days) and 7 days 15 hours (0700 hrs to 2200 hrs for entire week). However, location 10 was critical as it has some security concerns so for this particular location, permission for conducting survey was not granted. The mid-block count surveys obtained traffic volume by counting the number of vehicles at each count location.

Survey Form
Survey forms are attached in the Appendix A.

Survey Locations
The following are the survey locations for occupancy and mid-block surveys.

Table 2.4: MB & Occupancy Count Survey Location

Survey ID.	Location Name	Duration (Hours)	
		Volume Counts	Occupancy
Location 1	M.A Jinnah Road after Numaish	3	3
Location 2	Shahra e Quaideen near Allah Wali Chowrangi	3	3
Location 3	Shahra e Faisal near Karsaz	3	3
Location 4	Korangi Road near Akhter Colony	15	15
Location 5	Korangi Road near Shan Chowrangi	15	15
Location 6	Korangi Road near Awami Colony	3	3

Location 7	Korangi Road near Singer Chowrangi	3	3
Location 8	Landhi Industrial Area Road near Dawood Chowrangi	3	3
Location 9	Korangi Road near Kala Pull	3	3
Location 11	Shahra-e-Quaideen near Society Office	3	3
Location 12	Korangi Road near Shan Chowrangi	3	3
Location 13	Korangi Road near Mansehra Chowrangi	3	3
Location 14	Landhi Road	3	3
Location 15	Korangi Road near Nasir Colony	3	3
Location 16	Shah Faisal Town near Pak Sadaat Colony	3	3
Location 17	Shah Fraisal Colony near Natha Khan Brdige	3	3
Location 18	Malir Naddi Bridge Near Quaidabad	3	3
Location 19	Shaheed e Millat Expressway Near Manzoor Colony	3	3
Location 20	Korangi Road near Korangi Crossing	3	3
Location 21	Korangi Road after KPT Interchange	3	3
Location 22	M.A Jinnah Road near Jama Cloth	3	3
Location 23	Sir Shah Suleman Road Near Essa Nagri	3	3
Location 24	Karsaz Road near National Stadium	3	3
Location 25	Rashid Minhas Road near UBL Sports Complex	3	3
Location 26	Manghopir Road near Pakistan Quarters	3	3
Location 27	Mauripur Road Near Gulbai	3	3
Location 28	Shahrae Humayun Near Ayesha Manzil	3	3
Location 29	Manghopir Road near Metro Super Store	3	3
Location 30	N-25 Road Near Caltex pump	3	3
Location 31	Shahrae Usman Road Near Nagan Chowrangi	3	3
Location 32	New Karachi near Anda Morr	3	3
Location 33	Estate Avenue near Glaxo Smith Kline Industry	3	3
Location 34	Nazimabad near Baqai Hospital	3	3
Location 35	University Road nearAShfaq Memorial Hospital	15	15
Location 36	University Road Near Askari Park	3	3
Location 37	University Road Near Safari Park	3	3
Location 38	University Road Near Rizwan Society	3	3
Location 39	University Road near Karachi University	3	3
Location 40	New M A Jinnah Road near Islamia College	15	15
Location 41	Khayaban e Roomi Near Forum Mall	3	3
Location 42	M.A. Jinnah Road Near Tower	3	3
Location 43	Moulvi Tameezuddin Khan road near Bahria Complex III	3	3
Location 44	Mauripur Road Near Wazir Mansion Station	3	3

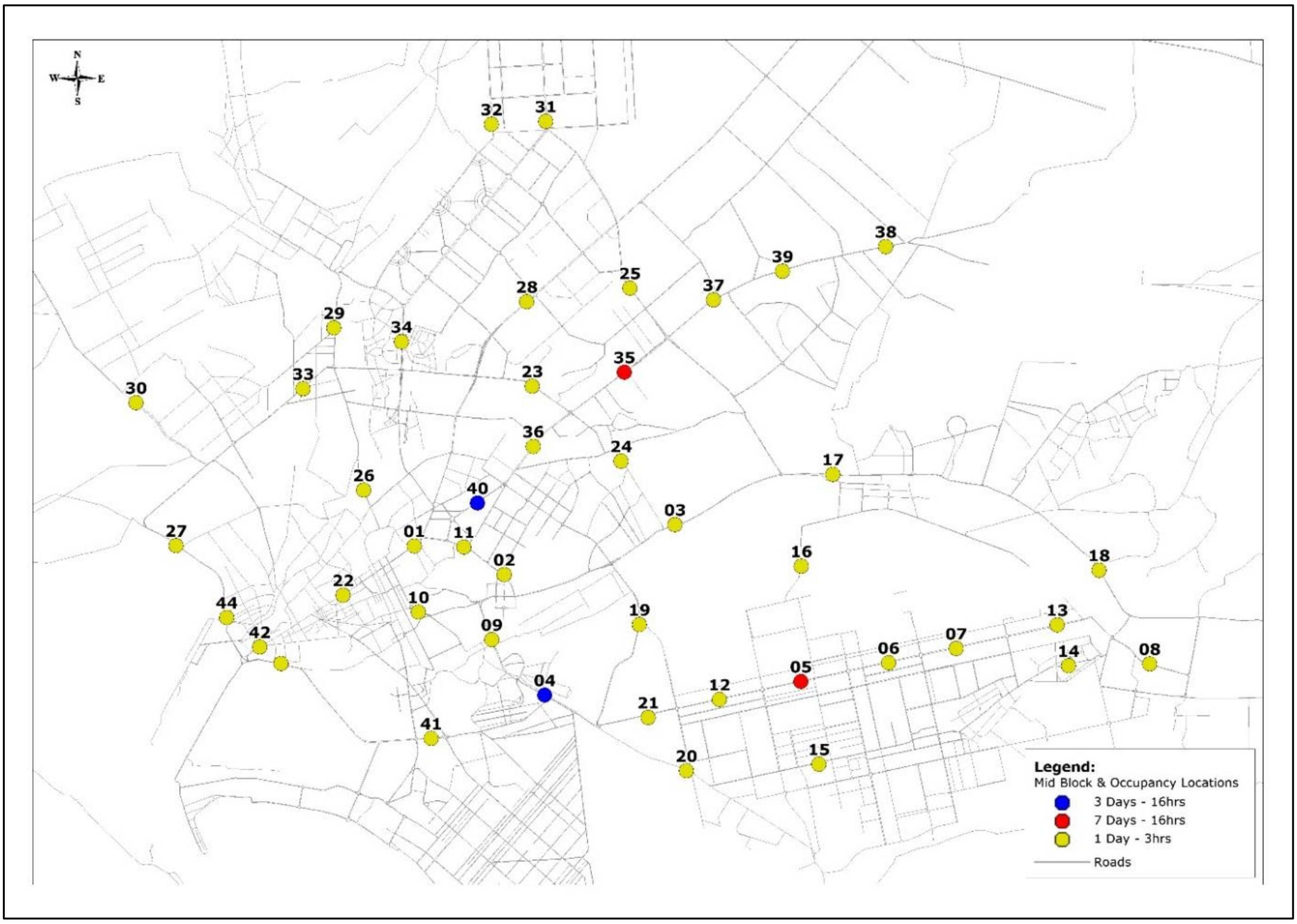


Figure 2.2: MB & Occupancy Count Survey Location

Sampling

The sampling rates for surveys on these locations were as follows:

- Traffic Count Survey was performed continuously capturing 100 percent of vehicles travelling in both directions for each of the mentioned vehicle categories.
- Vehicle Occupancy Survey was conducted on sample basis. The enumerators were instructed to capture the maximum number of vehicles however the target was to get a sample of at least 50 percent of passing vehicles for each category, direction and time interval Survey Method.

Following general guidelines were used to perform surveys on MB locations:

For Traffic Counting:

- Surveyors continuously counted the number of vehicles by direction, category and time.
- Surveyors counted number of vehicles manually using tally markings.
- The cumulative number of vehicles by direction and vehicle type were recorded on a summary form (during data punching) for every 15-minutes time interval.

For Vehicle Occupancy:

- The cumulative number of passengers by direction and vehicle type were recorded on a summary form (during data punching) for every 15-minutes interval.

2.4. Existing Bus Route Mapping

Existing Public Transport Route Mapping is a very important exercise that has been conducted. Following Public Transport Routes were mapped under this survey.

- Mini Buses
- Large Buses
- Coaches

Sampling

All existing Public Transport routes that are overlapping with Red Line and Yellow Line BRTS corridors were mapped under this type of survey.

Survey Method

A surveyor was seated in a Public Transport route with a hand held GPS device or existing road network map of Karachi city and mapped the entire route.

Table 2.5: Existing public transport operating routes for Red Line

Type	ID/ Name	In	Out
Bus	4M	NIPA	Empress Market
Mini Bus	F11	NIPA	JAIL CHOWRANGI
	G3	SAFORA	Tower
	G 17	SAFORA	SAFARI PARK
	G7	SAFORA	SUBZI MANDI
COACH	Gulistan	NIPA	Tower
	Shiraz	SAFORA	Tower
	Safari	SAFARI PARK	JAIL CHOWRANGI
	Super hasan zai	NIPA	JAIL CHOWRANGI
	Masood	SAFORA	NIPA

Table 2.6: Existing public transport operating routes for Yellow Line

Type	ID/ Name	In	Out
Bus	1-L	Kala Pul	Singer Chorangi
Mini Bus	F-11	Noorani Kabab	Dawood Chorangi
	D-11	KPT Flyover	Dawood Chorangi
	F-21	KPT Flyover	Murtaza Chorangi
	M-1	KPT Flyover	Shan Chorangi
COACH	W-22	Noorani Kabab	KPT Flyover
	X-23	Brooks Chorangi	Dawood Chorangi
	Mashriq	Kala Pul	Dawood Chorangi
	Shama	Noorani Kabab	KPT Flyover

Survey Form

Survey forms are attached in the Appendix A.

2.5. Public Transport Frequency Survey

Public Transport service frequency survey was conducted by counting number of buses per hour per direction on identified survey points to determine public transport service pattern.

Survey Locations

The survey was conducted at the designated spots along operational routes among BRT Red Line & Yellow Line Routes. Following survey points listed in 2.7 & Table 2.8.

Table 2.7: Major frequency survey locations along BRT Red Line Corridor

Site ID	Location
1	Safora Chowrangi
2	NIPA
3	Civic Centre
4	Numaish

Table 2.8: Major frequency survey locations along BRT Yellow Line Corridor

Site ID	Location
1	Daud Chorangi
2	KPT Flyover
3	Noorani Kabab House
4	Numiash

Survey Forms

Surveys Forms are attached in Appendix A.

Survey Schedule

Data collection for public transport frequency survey was gathered for 14 hours starting from 07:00 and ending at 21:00 hours and hence covered both peak & off peak hours of a typical weekday.

The survey was conducted on a weekday selected from Monday to Thursday. Public holidays, strike days or any day not representing typical traffic on a particular location was excluded from the survey schedule.

Survey Method

The following general guidelines applied to these surveys:

- Data collected:
  - Service frequency by direction by every 15 min
  - Identification of vehicle type
- The study team, in coordination with TMTD, coordinated for support of local police during field work

2.6. On-board Origin and Destination Survey

On Board Passenger Origin Destination Survey was conducted to collect Origin and destination information of passengers using existing Public Transport to develop public transport user OD matrix. Questionnaire was developed to ask their origin and destination, trip purpose and reason of mode choice. This survey was carried out in line with the Boarding & Alighting Survey and same specifications were used for it. However, separate enumerators were deployed to carry out this survey.

Survey Locations

For this survey, a preliminary pilot survey were conducted to understand the frequency of each existing operating route, which has certain overlapping with the Corridor. These surveys were conducted on Existing Public Transport routes running parallel to Red Line & Yellow BRTS Corridors.

Survey Schedule

The survey was conducted throughout the day to understand the travel pattern on these existing routes during both peak and off peak directions. However, as a general rule 10%-15% of the operations of each of the bus route was captured depending upon the frequency of existing Public Transport route operations.

All surveys were conducted on a weekday selected from Monday through Thursday, excluding public holidays, strike days or any day not representative of typical traffic pattern on designated routes above.

Vehicle Classification

The following types of vehicles were chosen for the board / alight survey:

- Mini Buses
- Large Buses
- Coaches

Survey Forms

Survey Forms are attached in Appendix A.

Survey Method

The following general guidelines applied to these surveys:

- The surveyor had to board the vehicle at the first terminal and alight at the last terminal within the overlapping zone of the route.
- While on-board, the surveyor had to interview the passenger and ask for their Origin & Destination of boarding and alighting passengers by gender at every stop (separate enumerators were deployed on each bus for each gender group for better accuracy).
- The survey was conducted for each route, in each direction of travel, for around 10%-15% of the total operations of that route divided into both peak and off peak directions.
- Surveyors had to ensure that all stoppages or locations where passengers board and/or alight the buses are to be interviewed.

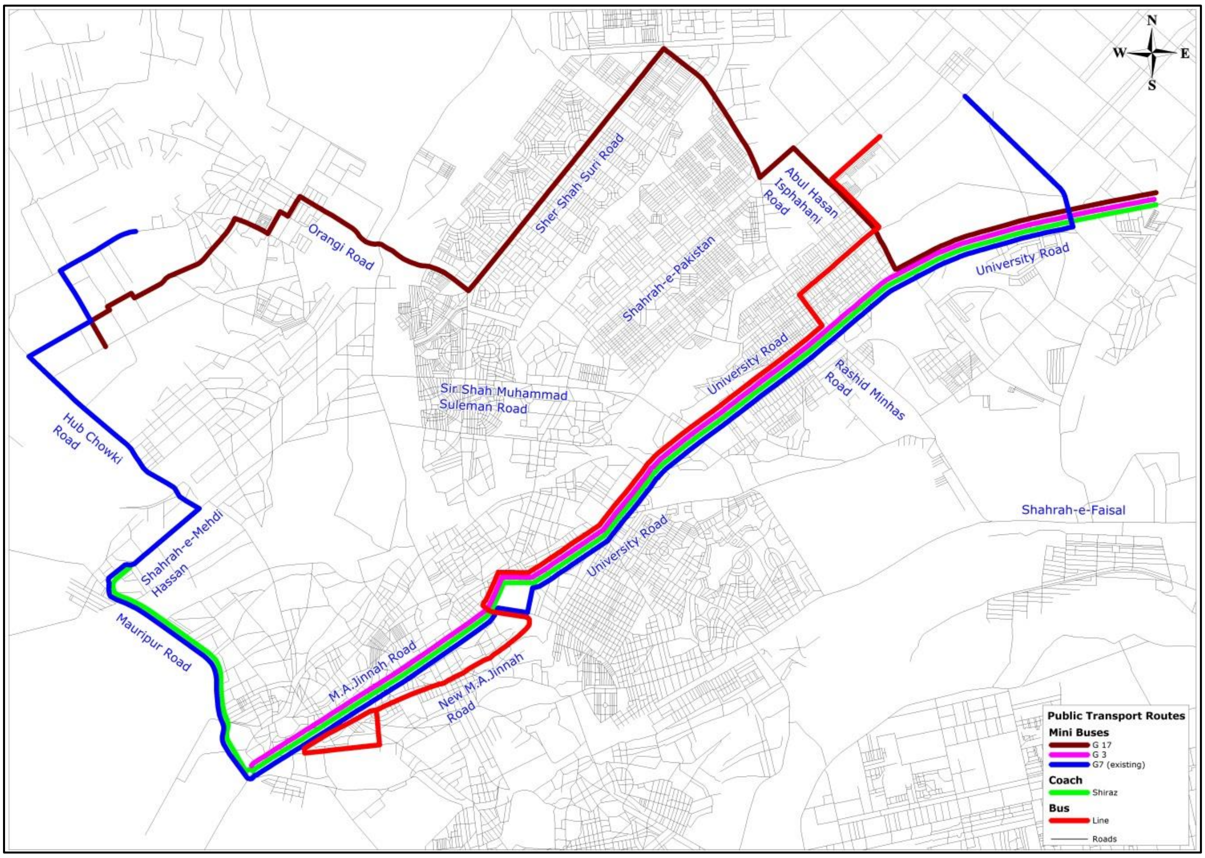


Figure 2.3: Existing public transport route map

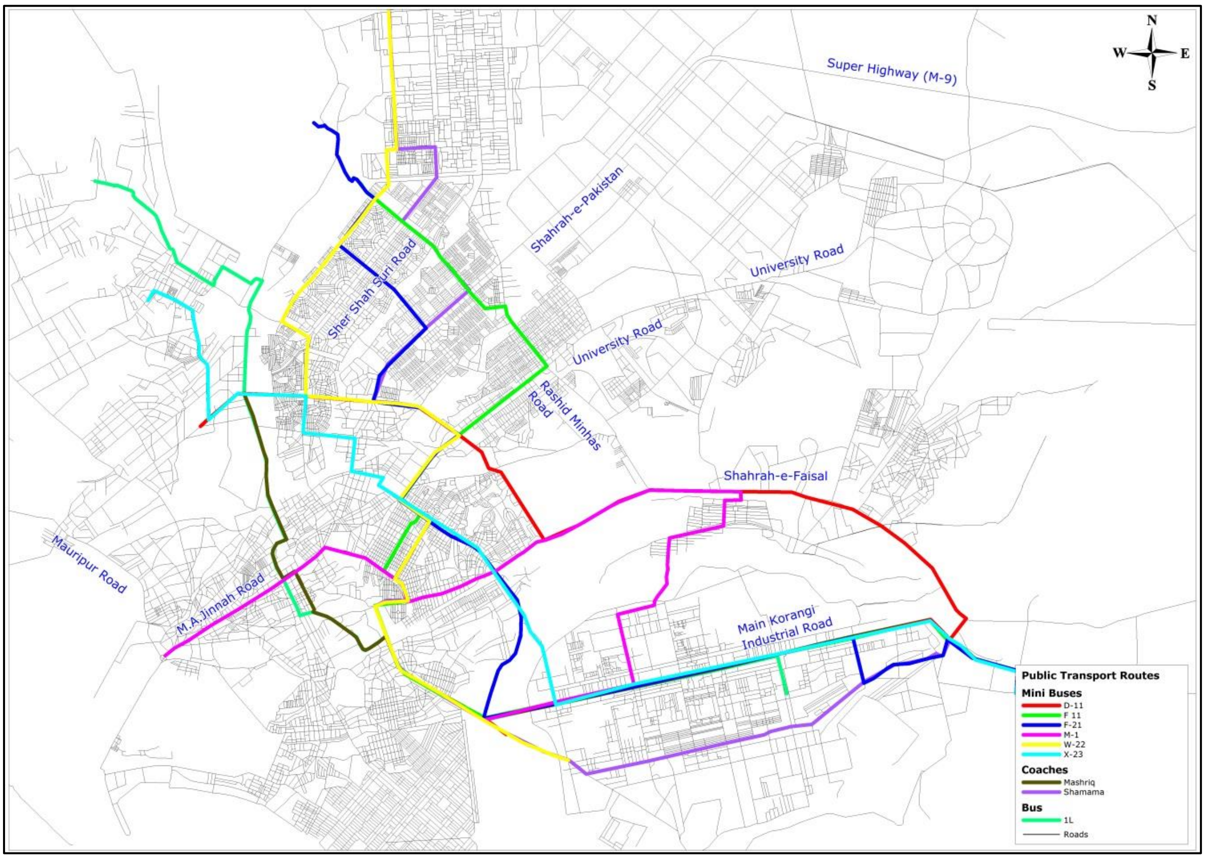


Figure 2.4: Existing public transport route map

2.7. Boarding and Alighting Surveys

On-board passenger boarding / alighting survey was conducted by recording number of passengers entering and exiting on public transport vehicle at each bus stop. The use of Global positioning system helps to determine existing operating bus route, boarding / alighting of passengers and travel speed.

Survey Locations
The rational for route select is based on two criteria, significant route overlap with BRT Lines and Significant route frequency.

The above criteria were applied to all overlapping routes including Public Transport and Para Transit with BRT Corridor. Based on this, existing public transport routes was selected.

Survey Schedule
For this survey, a preliminary pilot survey was first conducted to understand the frequency of each existing operating route, which at least has certain overlapping with BRT Corridor. Hence, surveys on these routes was carried out to collect boarding and alighting data of passengers.

The survey was conducted throughout the day to understand the travel pattern on these existing routes during both peak and off peak directions. However, generally 10%-15% of the operations of each of the bus route was captured depending upon the frequency of existing Public Transport route operations.

All surveys were conducted on a weekday selected from Monday through Thursday, excluding public holidays, strike days or any day not representative of typical traffic pattern on designated routes above.

Vehicle Classification
The following types of vehicles were chosen for the board / alight survey:

- Mini Buses
- Large Buses
- Coaches

Survey Forms
Survey Forms are attached in Appendix A.

Survey Method
The following general guidelines apply to these surveys:

- The surveyor boarded the vehicle at the first terminal, travel through the route and alighted at the last terminal on the overlapping route.
- While on-board, the surveyor was counting the number of stops, the number of boarding and alighting passengers by gender at every stop, the total travel time, and the time taken at every stop and the duration and cause of any delay.
- The survey was conducted for each route, in each direction of travel, for around 10%-15% of the total operations of that route divided into both peak and off peak directions.
- Surveyors ensured that all stoppages or locations where passengers board and/or alight the buses are recorded and all columns in the survey form are filled.
- The surveyors also ensured that all stoppages are recorded even if passenger boards and/or alights do not occur at this location as stoppage could occur because of traffic signals, traffic congestion etc., in this case, all information has to be filled on the form.

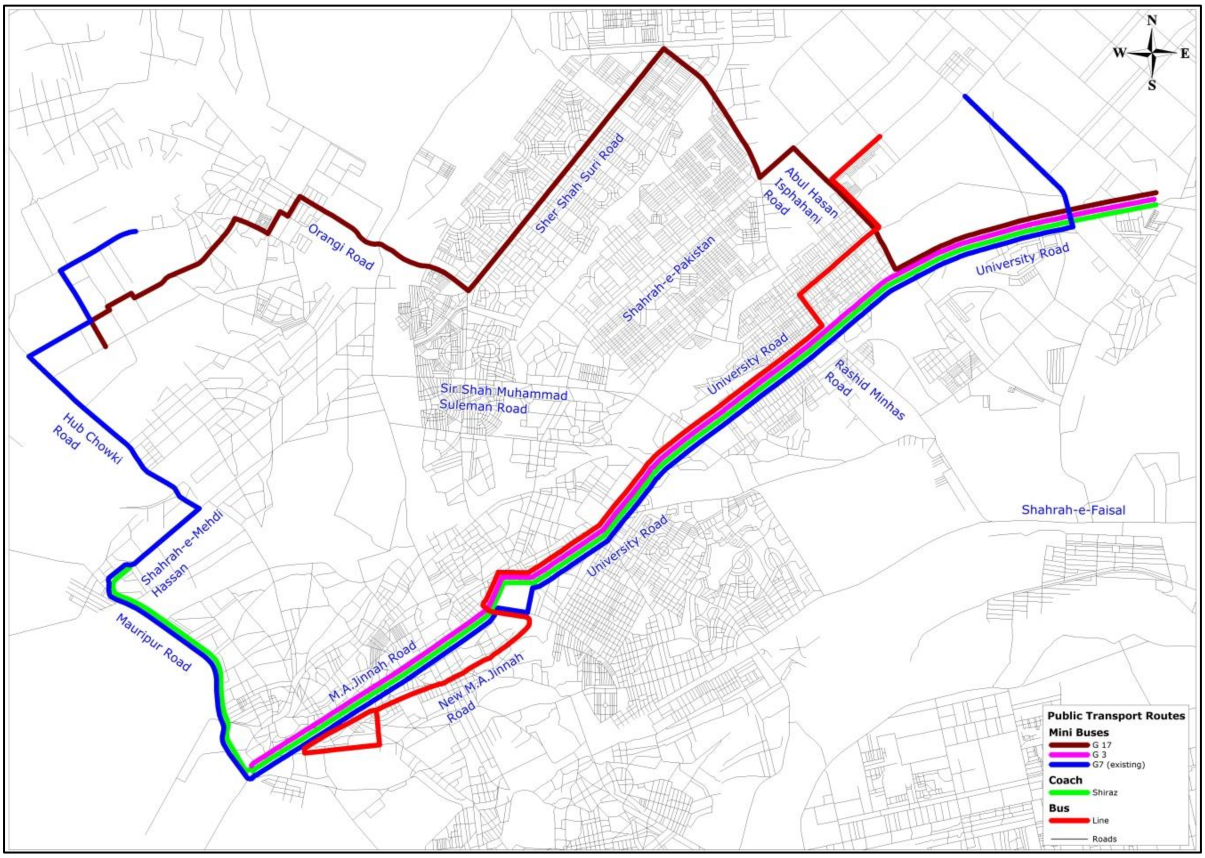


Figure 2.5: Existing public transport route map

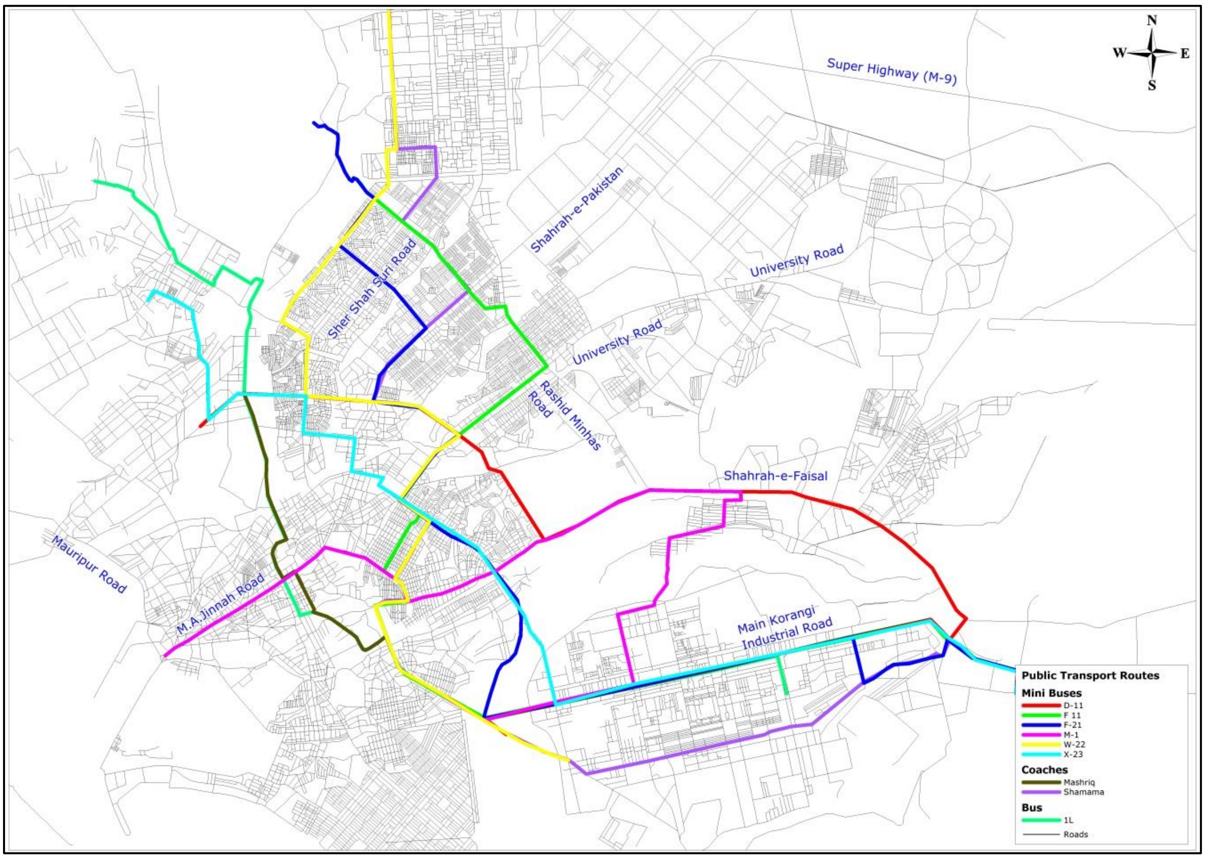


Figure 2.6: Existing public transport route map

2.8. Public Transport User Interview Surveys

Public Transport User Interview Surveys was carried out to collect Origin and destination information of passengers using existing Public Transport to develop public transport user OD matrix. Questionnaire has been developed to ask their origin and destination trip purpose and reason of mode choice.

Survey Locations

Interviews was conducted on following major existing Public Transport bus stops. The survey locations are mentioned in the table:

Table 2.9: Survey Locations for Public Transport User Interview Surveys Red Line

Site ID	Location
1	Safoora Chowrangi
2	Karachi University Silver Jubilee
3	NIPA
4	Civic Centre
5	Jail Chowrangi
6	Numaish

Interviews were conducted on following major existing Public Transport bus stops.

Table 2.10: Survey Locations for Public Transport User Interview Surveys Yellow Line

Site ID	Location
1	Dawood Chorangi
2	Shan Chorangi
3	KPT Flyover
4	Defense More
5	FTC Interchange
6	Nursery

Survey Schedule

Public Transport User Interview survey was conducted from 07:00 to 10:00 during Morning Peak for all major bus stop locations.

The survey was conducted on a weekday selected from Monday to Thursday. Public holidays, strike days or any day not representing typical traffic on a particular location was excluded from the survey schedule.

Sampling

The sampling rates are as follows:

- It is important to mention here that Simple Random Sampling Method was adopted to gather the information from Existing Public Transport users. Since these interviews was conducted on all major existing bus stops, so people coming from the vicinity as well as transfer passengers are being interviewed in this type of survey.

Bus Classification at Each Stop

The types of bus at each stop for the passenger interview survey are classified as follows:

- Mini Buses
- Large Buses
- Coaches

Survey Forms
Survey Forms are attached in Appendix A.

Survey Method
Following are general principles based on which the interviews was conducted.

- The consultant, led by the supervisor, sets up the interview area at the specified bus stop.
- Supervisor or team leader selected sample passengers at random for interviewing.
- Surveyors interviewed the passengers and filled in the interview form.
- The interviews were aimed to gather information regarding their trip ODs, occupation, trip frequency, distance that they travel to come to this land use, usual fare levels, level of satisfaction against fare / service and their average waiting time at the bus stop (if any).
- This helped in analyzing various parameters related to the quality of service, demand between certain OD pairs and the zone of influence that a usual bus stop attracts people from. This assisted in calculating parameters like target population in the service area, physical size of service area and potential places for new bus stop locations (mainly for Off Corridor routes). Moreover, the interviews also helped in estimating the elasticity of demand with respect to the various service parameters.
- The Passenger Interview Survey was conducted on all bus stops of the study area consists of following elements. Interview was conducted with the persons waiting for bus at designated bus stops.
- The passenger interview questionnaire gathered information on passenger household conditions, the origin, destination and purpose of the trip, cost of travel, the level of satisfaction with current transport modes and desired improvements etc.

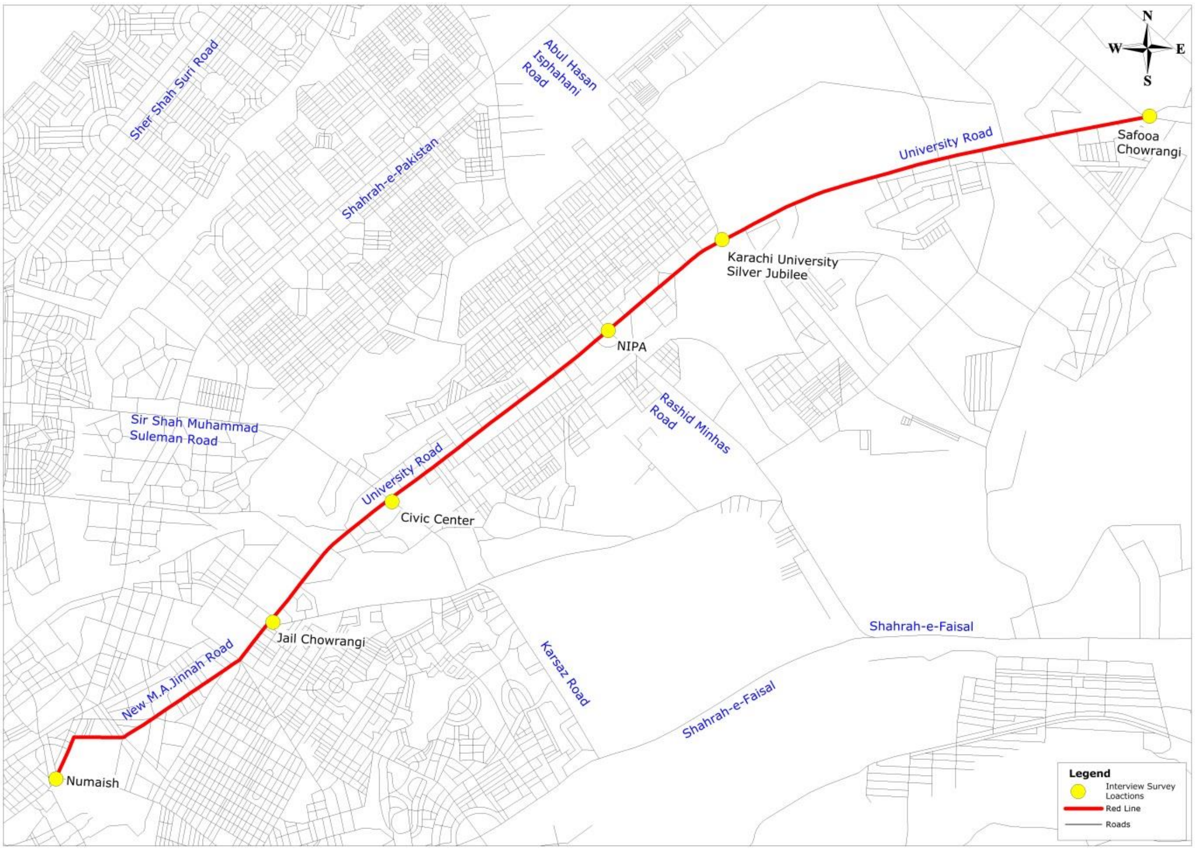


Figure 2.7: Major bus stop interview survey locations on Red Line

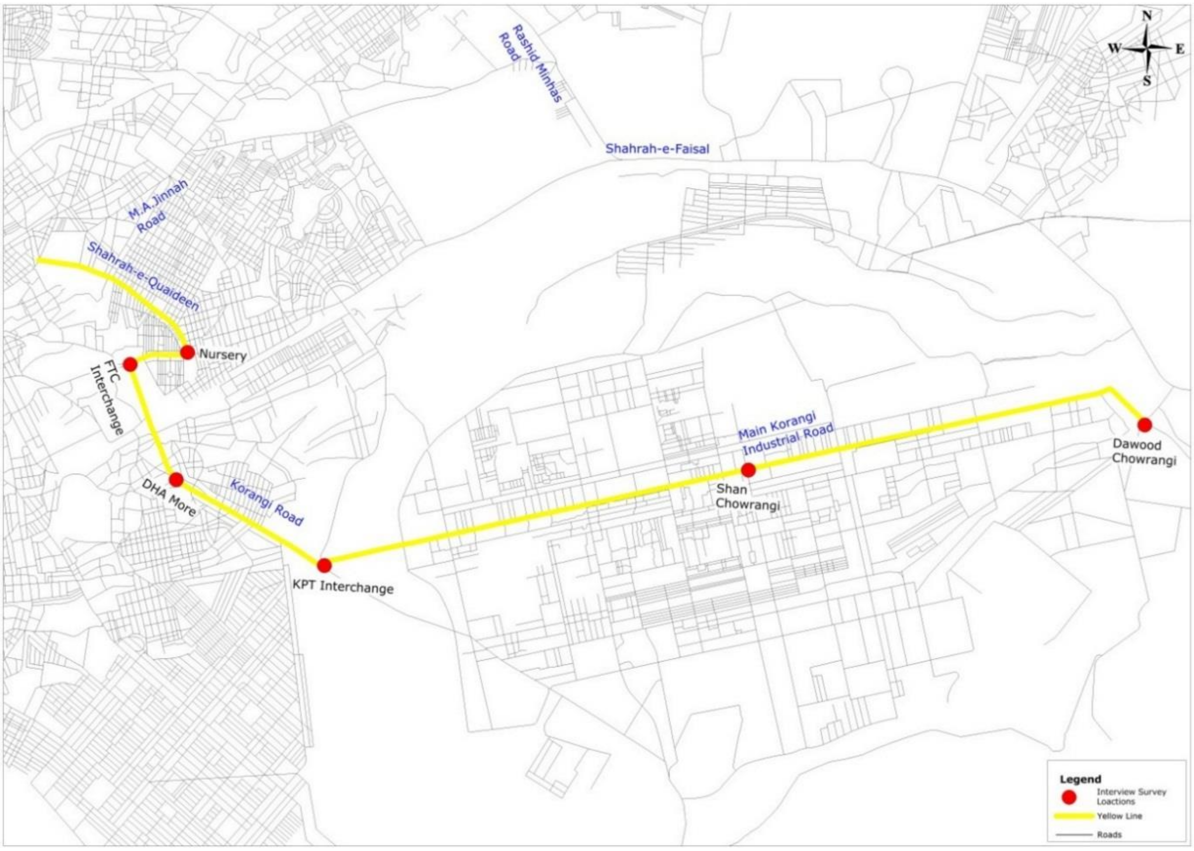


Figure 2.8: Major bus stop interview survey locations on Yellow Line

2.9. Public Transport User Stated Preference Survey

Stated Preference or Willingness to Pay Survey was carried out in line with the Public Transport User Interview Survey. This survey will help in estimating elasticity of demand with respect to the various service parameters especially with fare. Special emphasis was given to tap the affordability of existing bus users and private vehicle users by asking them about their willingness to pay for the new service. This will certainly help in setting the fare structure for the new service.

Survey Locations

Interviews was conducted on all major existing Public Transport bus stops as well as all major Fuel Stations locations along BRT Red Line & Yellow Line Corridor.

Table 2.11: Survey Locations for Public Transport User Stated Preference Survey Red Line

Site ID	Location
1	Safora Chowrangi
2	Karachi University Silver Jubilee
3	NIPA
4	Civic Centre
5	Jail Chowrangi
6	Numaish

Table 2.12: Survey Locations for Public Transport User Stated Preference Survey Yellow Line

Site ID	Location
1	Dawood Chorangi
2	Shan Chorangi
3	Akhtar Colony
4	Defense More
5	FTC Interchange
6	Nursery

Survey Schedule

Stated Preference survey was conducted from 07:00 hours to 10:00 hours for morning peak for all major bus stop locations.

The survey was conducted on a weekday selected from Monday to Thursday. Public holidays, strike days or any day not representing typical traffic on a particular location was excluded from the survey schedule.

Sampling

The sampling rates are as follows:

- It is important to mention here that Simple Random Sampling Method was adopted to gather the information from Existing Public Transport users. Since these interviews were conducted on all major existing bus stops, so people coming from the vicinity as well as transfer passengers was being interviewed in this type of survey.

Survey Method

Following are general principles based on which the interviews was conducted.

- The consultant, led by the supervisor, set up the interview area at the specified bus stop.
- Supervisor or team leader selected sample passengers at random for interviewing.

- Surveyors interviewed the passengers and filled in the interview form.
- The interviews have aimed to gather information regarding their trip ODs, occupation, trip frequency, distance that they travel to come to this land use, usual fare levels, level of satisfaction against fare / service and their average waiting time at the bus stop (if any).
- This helped in analyzing various parameters related to the quality of service, demand between certain OD pairs and the zone of influence that a usual bus stop attracts people from. This would assist in calculating parameters like target population in the service area, physical size of service area and potential places for new bus stop locations (mainly for Off Corridor routes). Moreover, the interviews would also help in estimating the elasticity of demand with respect to the various service parameters.
- The Passenger Interview Survey was conducted on all bus stops of the study area consists of following elements. Interview was conducted with the persons waiting for bus at designated bus stops.
- The passenger interview questionnaire gathered information on passenger household conditions, the origin, destination and purpose of the trip, cost of travel, the level of satisfaction with current transport modes and desired improvements etc.

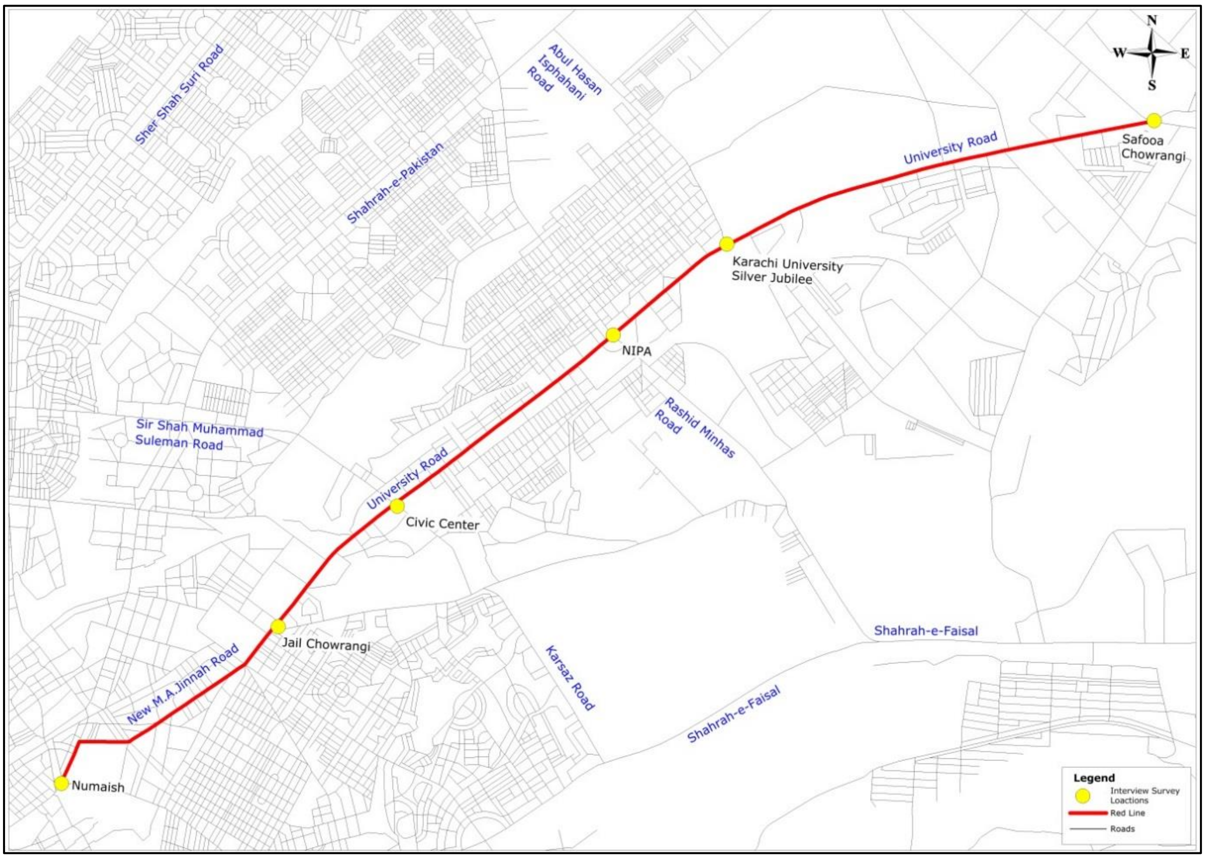


Figure 2.9: Major bus stop interview survey locations for Stated Preference Survey

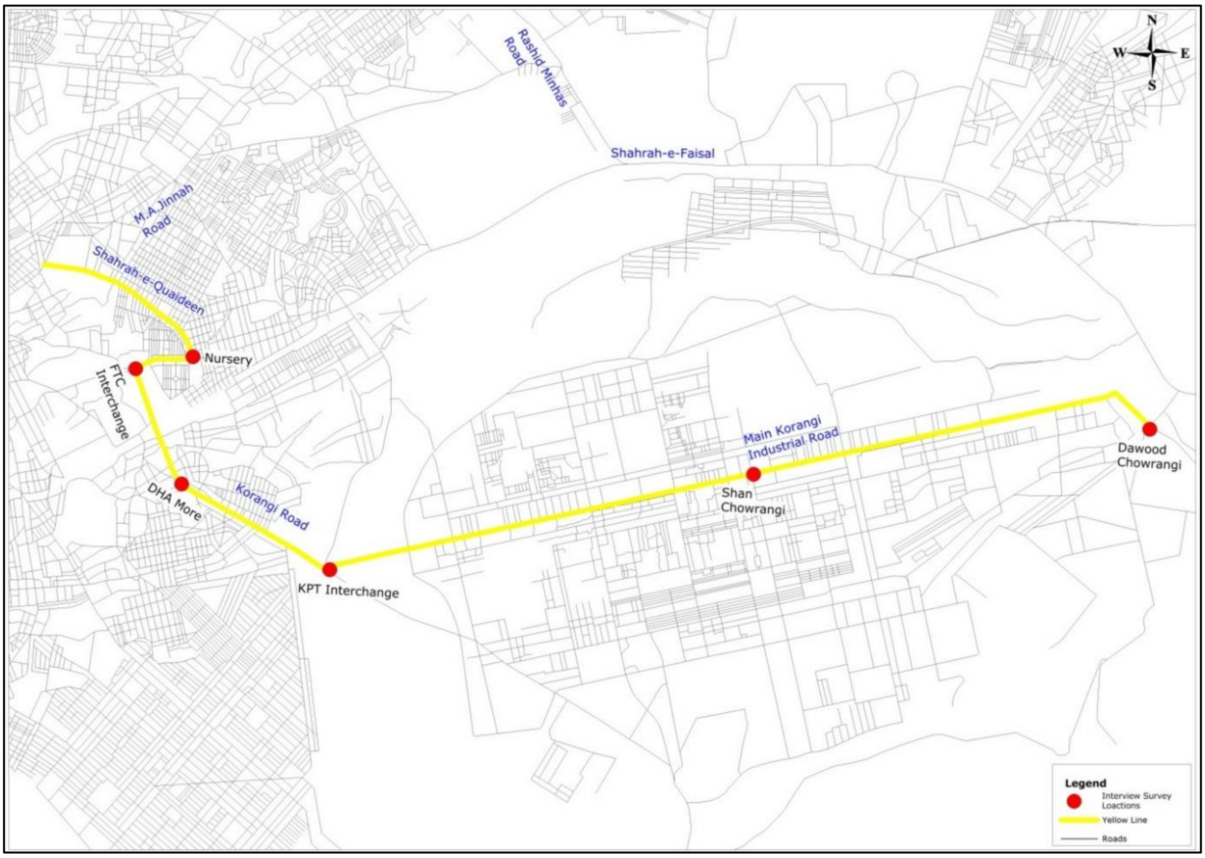


Figure 2.10: Major bus stop interview survey locations for Stated Preference Survey

2.10. Private Vehicle User Interview Surveys

Private Vehicle User Interview Surveys were carried out to collect Origin and destination information of passengers using Private Transport to develop Private transport user OD matrix. Questionnaire was developed to ask their origin and destination trip purpose and reason of mode choice.

Survey Locations
Interviews were conducted on all major gas stations along the corridor.

Survey Forms
Survey Forms are attached in Appendix A.

Survey Schedule
Private Vehicle User Interview survey was conducted throughout the day at major Petrol Pumps that lie within the Corridors.

Sampling
The sampling rates are as follows:

- It is important to mention here that Simple Random Sampling Method was adopted to gather the information from Existing Private Transport users. Since these interviews was conducted on all major gas stations, so people coming from the vicinity are being interviewed in this type of survey.

Classification at Each Station
The types of Private Vehicle at each station for the passenger interview survey are classified as follows:

- Private Cars
- Motor Cycles

Survey Method

Following are general principles based on which the interviews was conducted.

- The consultant, led by the supervisor, set up the interview area at the specified gas stations.
- Supervisor or team leader selected sample passengers at random for interviewing.
- Surveyors interviewed the passengers and filled in the interview form.
- The interviews had aimed to gather information regarding their trip ODs, occupation, trip frequency, distance that they travel to come to this land use, usual fare levels, level of satisfaction against fare / service and their average waiting time at the bus stop (if any).
- This helped in analyzing various parameters related to the quality of service, demand between certain OD pairs and the zone of influence that a usual bus stop attracts people from. This assisted in calculating parameters like target population in the service area, physical size of service area and potential places for new bus stop locations. Moreover, the interviews also helped in estimating the elasticity of demand with respect to the various service parameters.
- The passenger interview questionnaire gathered information on passenger household conditions, the origin, destination and purpose of the trip, cost of travel, the level of satisfaction with current transport modes and desired improvements etc.

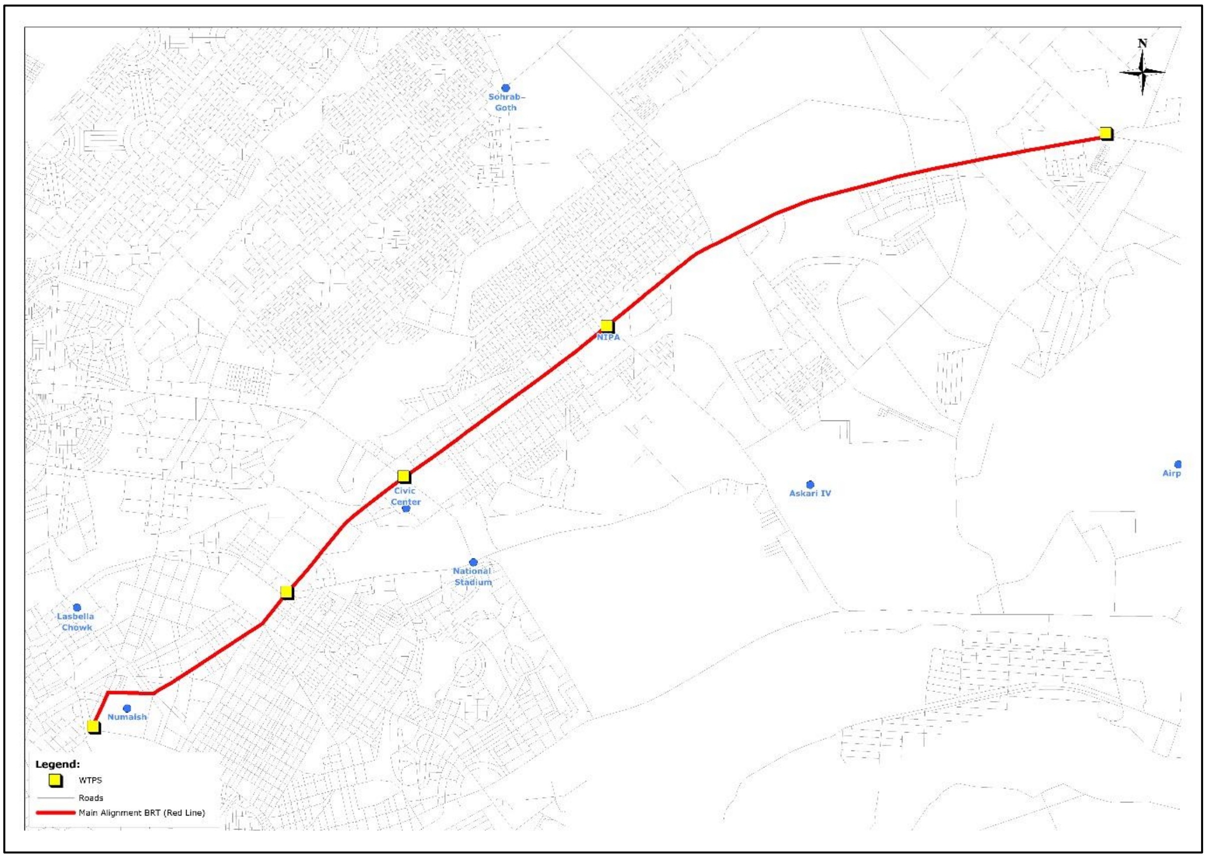


Figure 2.11: Major Private Vehicle Interview survey locations for Red Line

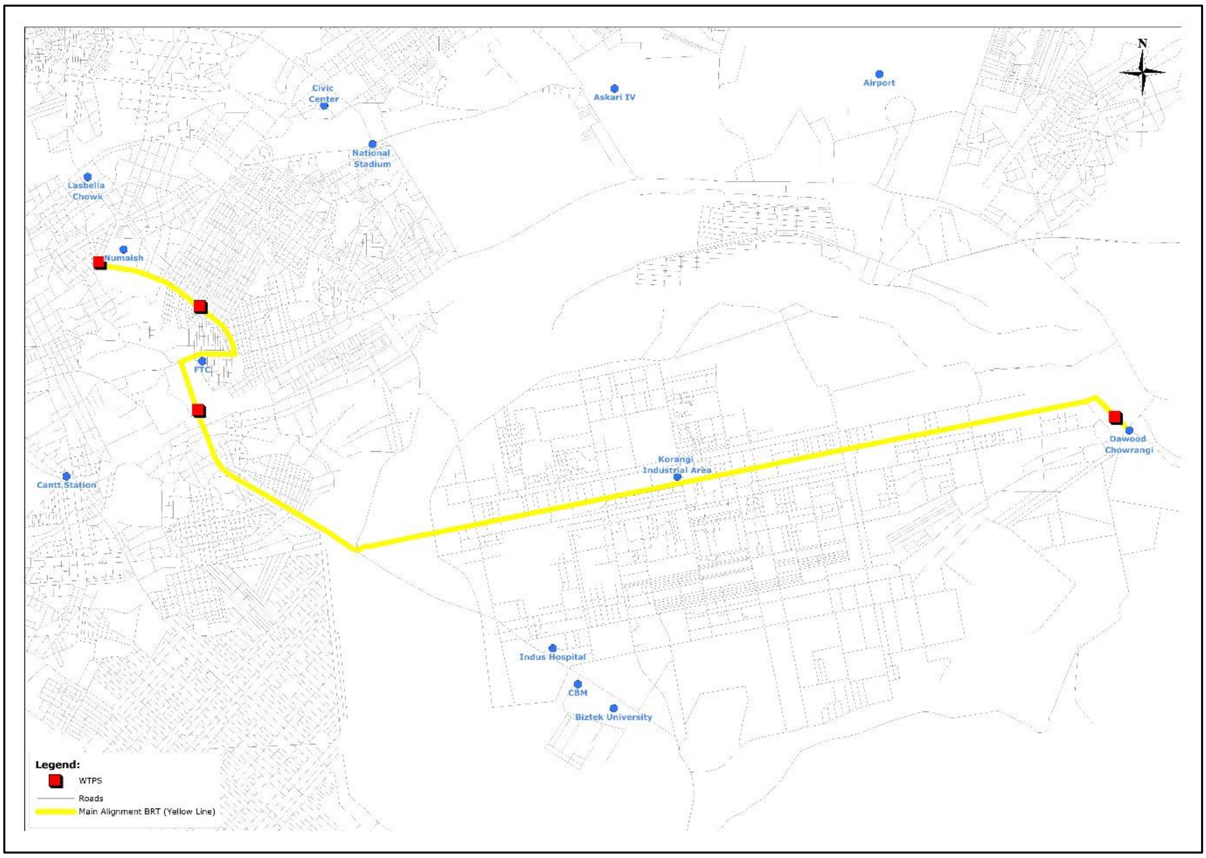


Figure 2.12: Major Private Vehicle Interview survey locations for Yellow Line

2.11. Signal Assessment Survey

Existing Signal timings was collected for all signalized junctions that lie in both BRTS Red & Yellow Lines Corridor. These timings would then be used for proposing improvements in operations of junctions for the entire corridors in general and for the implementation of signal optimization in particular.

Survey Locations

The surveys were conducted at all signalized junctions that lie within BRT Red Line & Yellow Line Corridor.

Sampling

As discussed earlier signal timings of all signalized junctions that are signalized even after the implementation of the BRT corridors will be collected from the field.

Survey Schedule

These surveys were conducted on a typical weekday for both morning and evening peak timings in order to understand the situation of each signalized junction on a daylong basis.

Survey Method

A team of surveyors was deployed along the corridors to verify the number of signals junctions and then collect existing signal timings for each of the junction. Complete cycle length along with signal phasing diagram was collected from the field, which will then be used for various optimization purposes.

Survey Forms

Survey Forms are attached in Appendix A.

2.12. Travel Speed Surveys

Travel Speed Survey was conducted to estimate the existing travel time for BRT Red Line Corridor from Jinnah Avenue to Numaish and vice versa and for BRT Yellow Line Corridor from Numaish to Dawood Chowrangi and vice versa. This survey was carried out through 'Floating Car Technique'. It will help in estimating the overall existing performance of the highway network for the city of Karachi.

Survey Locations

This survey was conducted for entire BRT Corridor.

Sampling

3 separate runs during morning peak were carried out between 0700 hrs and 1000 hrs at hourly basis from both directions i.e. from Jinnah Avenue to Numaish and from Numaish to Dawood Chowrangi.

Survey Method

As discussed earlier, this survey was conducted through 'Floating Car Technique' and hence an enumerator was travelling in private vehicle in mixed traffic at a speed possible along the Right of Way (ROW).

2.13. Existing Public Transport Sector Survey

Pre-Survey of Existing Bus Stops and Route Visits:

To gain the initial knowledge of the public transport operations, the negotiation team should visit the following stations:

a) Existing Public Transport Terminals along Red Line BRTS Corridor
b) Existing Public Transport Terminals along Yellow Line BRTS Corridor

The purpose of the visit is to be familiarized with the target audience, their mode of services, route operations, support service operations like tire shops, mechanics, small hotels etc. to objectively identify the magnitude of the sector being impacted after the BRT service.

Pilot Survey – Testing the Environment:

Keeping in view the holistic approach and complexity involved in the component and unavailability of adequate information, the negotiation team will design a preliminary pilot survey to be conducted with chosen 2 – 3 individual sets i.e. drivers, conductors of 2 – 3 random routes. This will guide the team on the size of the sector, identifying who is who in the sector, role of associations (an opportunity or a challenge for vulnerable drivers and conductors) and future course of action and survey methodology.

Survey Form

Survey Form for this survey is attached in Appendix A.

2.14. Data Quality Assurance

One of the most important aspects of field surveys is to maintain quality during data collection and data entry. These steps are extremely important. In order to ensure data qualities both in field and during data punching several mechanisms had been adopted and these are discussed in this section of the report.

2.14.1. Selection of Survey Teams

Selection of survey teams and their team configuration was of extreme importance and it is because of this reason the survey teams were divided into two broad categories i.e. the ones involving interaction with users (Interviews on Bus Stops, Boarding & Alighting Surveys) and the others, not involving interaction with users (Mid-Block Counts & Occupancy Surveys & Road Inventory Surveys).

2.14.2. Training and Pre-Testing Survey Sessions

The essence of data quality assurance lies in selection and training of human resources being used for field surveys. For all the three survey groups (teams) mentioned above, pre-survey training camps were organized.

These camps were arranged multiple times during field surveys. This had ensured good quality of human resources doing the field surveys and had therefore diminished chances of errors because of unawareness of enumerator’s data collection technique.

Furthermore, care was given to conduct proper field trials and pilot surveys to each of the enumerator and its better understanding of the type of work as well as difficulties to be faced in field.

Last but not the least special care was also being given to number of persons attending these training sessions. It had been decided that each trainee group is not to exceed 20 persons as this would ensure focus of the trainers on individual enumerator.

2.14.3. Quality Checks in Field

Although the field staff was properly trained however in order to eradicate further chances of field chaos and wrong data recording, two relievers (also acting as assistant supervisors) and one site supervisor was also assigned.

These assistant supervisors and supervisor had randomly taken samples for each of the selected mode and had compare his counts / survey results with the enumerator results in field time and again during the surveys to check quality of data being gathered.

The field survey sheets being filled in by the supervisors / assistant supervisors were also been punched and simultaneously checked by analysis team. This ensured chances of repetitive mistakes by a specific enumerator.

Further to facilitate this process enumerator’s attendance was taken according to direction of travel, mode and type of survey he had been assigned on a specific day. This is because each enumerator could then be checked by analysis team for types on errors any specific.

Above all survey personnel from consultant office enumerator is committing in the field and taking decision to replacing the enumerator, if required had regularly visited these sites this also ensue best data quality being maintained in the field.

2.14.4. Quality Checks during Data Entry

Once data would have arrived to the data entry site the supervisors and shift in charges for data entry first converted tally marks in numeric counts. Later this converted sheet was being given to the data entry operator.

Above all, consultants study team was continuously monitoring data quality assurance by physically verifying between the figures being punched with those actually recorded in the field. This technique minimized possibility of data being wrongly entered.

2.14.5. Logical and Consistency Checks

Once the data from data punching site arrived for analysis the same had been logically checked for any inconsistencies and logical errors. If in case of any inconsistency found in the data, it was referred back to the survey forms for final checking and correction.

Traffic Survey Photographs have been shown below:

Figure 2.13: Traffic Survey and Training Session Photographs

3. SURVEY RESULTS & ANALYSIS

3.1. MB & Occupancy Count Survey:

Classified MB & Occupancy Count Surveys were performed to estimate the traffic volume on the existing roads that lie in the BRTS Corridors (both On-Corridor & Off-Corridors). This survey is of utmost importance for traffic planning, design and operational aspects. Modal classified counts were collected from the field and hence the survey form was also designed to obtain the output which is attached in Appendix A. For most locations data was collected for 3 hrs during morning peak from 0700 hrs 1000 hrs. Whereas for a few major locations it was collected for 15 hrs from 0700 hrs to 2200 hrs for 3 days i.e. 1 weekday and Saturday & Sunday. And for 1 location in the CBD area it was collected for 15 hrs per day from 0700 hrs to 2200 hrs and for 7 consecutive days. Table below shows the duration and location description for each survey location under the category of this survey.

Table 3.1: MB & Occupancy Count Survey LocationError! Not a valid link.

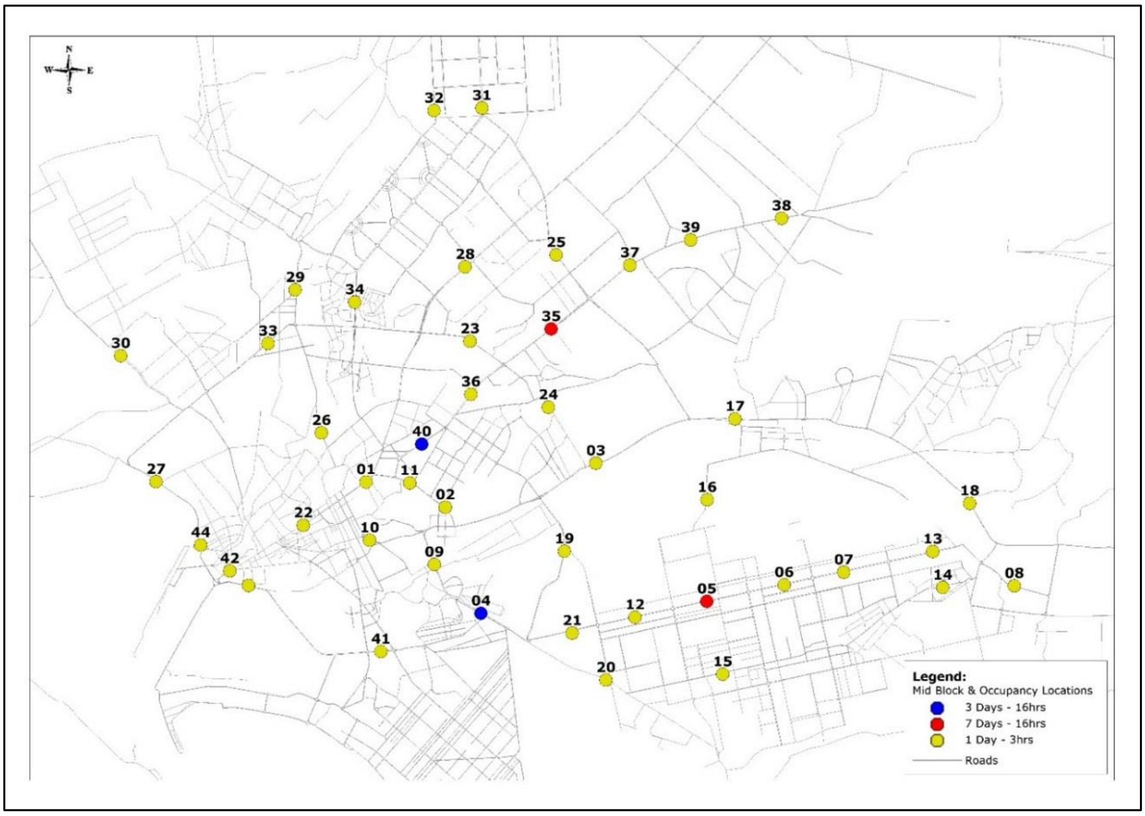


Figure 3.1: MB & Occupancy Count Survey Location

It is important to mention here that during the survey; Public Transport modes have been captured at locations where usual Public Transport routes does not pass through. The reason is that apart from formal public transport routes some contract carriages in terms of modes that are similar to those of public transport modes also operates in the city and are being captured during the course of the survey. However, in the development of the Transport Demand Forecast Model those vehicles have not been considered as Public Transport and they had been adjusted during the data processing stage. So this factor is dealt with special care so that the Transport Demand Model should present a realistic situation.

The detailed mid-block count and occupancy survey data is attached in Appendix A. A summary of volume counts and occupancy survey data at different locations is given below.

Table 3.2: Classified Mid-Block Results Summary

Survey ID.	Location Name	Private Cars	Taxies	Auto Rickshaws	Motorcycles & Scooters	Public Transport			Freight Transport			Total
						Coaches	Mini Bus	Large Bus	Light Freight	Single Unit	Trailers	
Location 1	M.A Jinnah Road after Numaish	5370	255	2374	8372	220	401	279	66	43	34	17,414
Location 2	Shahra e Quaideen near Allah Wali Chowrangi	8,138	157	1,983	7,624	121	237	11	86	147	0	18,504
Location 3	Shahra e Faisal near Karsaz	9841	617	1669	17959	142	200	112	82	25	27	30,674
Location 4	Korangi Road near Akhter Colony	24,257	987	12,332	57,245	635	1,171	399	643	790	51	98,510
Location 4	Korangi Road near Akhter Colony	19168	616	12998	45501	585	829	195	512	346	10	80,760
Location 4	Korangi Road near Akhter Colony	24,201	944	15,228	56,922	1,042	1,041	416	588	777	43	101,202
Location 5	Korangi Road near Shan Chowrangi	23369	1049	5609	43693	1073	1248	1074	871	1896	619	80,501
Location 5	Korangi Road near Shan Chowrangi	16,287	1,118	5,547	45,873	1,631	1,077	534	3,087	2,638	503	78,295
Location 5	Korangi Road near Shan Chowrangi	16525	864	7047	47622	1909	1451	1370	1997	3293	754	82,832
Location 5	Korangi Road near Shan Chowrangi	18,137	1,151	6,134	45,113	1,954	1,522	1,242	1,027	2,552	791	79,623
Location 5	Korangi Road near Shan Chowrangi	21614	756	5685	65184	2512	1938	1935	962	3170	697	104,453
Location 5	Korangi Road near Shan Chowrangi	18,222	1,027	6,395	54,958	1,696	1,566	1,416	1,087	3,652	881	90,900
Location 5	Korangi Road near Shan Chowrangi	15024	918	4685	42364	1236	1413	1161	3058	4310	1130	75,299
Location 6	Korangi Road near Awami Colony	5,072	200	894	13,778	230	559	223	610	902	349	22,817
Location 7	Korangi Road near Singer Chowrangi	2212	137	524	11496	335	142	233	307	900	159	16,445
Location 8	Landhi Industrial Area Road near Dawood Chowrangi	1,007	83	959	5,493	226	189	164	152	361	158	8,792
Location 9	Korangi Road near Kala Pull	4070	58	1193	8049	178	492	119	149	84	3	14,395
Location 11	Shahra-e-Quaideen near Society Office	3,938	39	1,803	7,088	41	228	36	83	15	0	13,271
Location 12	Korangi Road near Shan Chowrangi	3707	239	979	10861	308	346	189	296	163	73	17,161
Location 13	Korangi Road near Mansehra Chowrangi	1,333	118	463	5,449	213	266	164	112	330	479	8,927
Location 14	Landhi Road	758	30	604	4594	58	76	52	75	27	0	6,274
Location 15	Korangi Road near Nasir Colony	1,094	128	1,611	7,654	221	168	188	33	14	0	11,111
Location 16	Shah Faisal Town near Pak Sadaat Colony	4260	145	1241	19450	0	0	204	118	313	0	25,731
Location 17	Shah Fraisal Colony near Natha Khan Brdige	23,400	667	1,634	35,151	166	349	257	186	34	2	61,846
Location 18	Malir Naddi Bridge Near Quaidabad	3746	257	651	12502	229	276	394	412	171	44	18,682
Location 19	Shaheed e Millat Expressway Near Manzoor Colony	8,291	126	1,331	7,861	80	172	30	150	121	88	18,250
Location 20	Korangi Road near Korangi Crossing	3577	149	2030	14815	193	260	101	155	100	6	21,386
Location 21	Korangi Road after KPT Interchange	3,540	190	1,092	14,154	376	229	74	114	1,097	3	20,869
Location 22	M.A Jinnah Road near Jama Cloth	4731	132	3102	12793	289	226	110	35	30	0	21,448
Location 23	Sir Shah Suleman Road Near Essa Nagri	8,920	265	2,679	12,843	144	398	101	207	65	12	25,634
Location 24	Karsaz Road near National Stadium	14225	377	1838	10820	39	182	78	164	230	0	27,953
Location 25	Rashid Minhas Road near UBL Sports Complex	7,184	432	4,319	10,328	93	401	50	210	410	0	23,427
Location 26	Manghopir Road near Pakistan Quarters	1395	91	2356	5830	151	81	87	192	31	13	10,227
Location 27	Mauripur Road Near Gulbai	2,271	137	854	6,668	202	251	48	217	267	700	11,615
Location 28	Shahrae Humayun Near Ayesha Manzil	8096	331	4959	18831	87	155	349	446	557	188	33,999
Location 29	Manghopir Road near Metro Super Store	641	95	2,008	6,560	217	159	64	220	105	7	10,076
Location 30	N-25 Road Near Caltex pump	1602	194	1205	6832	309	193	179	81	601	177	11,373
Location 31	Shahrae Usman Road Near Nagan Chowrangi	3,982	173	3,459	9,598	110	156	75	190	102	7	17,852
Location 32	New Karachi near Anda Morr	1004	30	802	3178	0	45	20	0	71	0	5,150
Location 33	Estate Avenue near Glaxo Smith Kline Industry	4,184	166	663	10,585	92	344	83	290	260	435	17,102
Location 34	Nazimabad near Baqai Hospital	5181	117	3033	10846	50	131	188	219	77	0	19,842
Location 35	University Road nearAShfaq Memorial Hospital	38,010	767	15,341	51,803	385	1,499	177	523	1,407	73	109,985
Location 35	University Road nearAShfaq Memorial Hospital	40679	954	20027	47527	1093	2779	286	465	1933	267	116,010
Location 35	University Road nearAShfaq Memorial Hospital	43,021	1,355	18,783	48,519	1,137	2,682	347	1,231	1,394	318	118,787
Location 35	University Road nearAShfaq Memorial Hospital	42384	1128	18685	44584	1108	2871	327	1192	1355	163	113,797
Location 35	University Road nearAShfaq Memorial Hospital	42,137	902	15,792	37,416	1,102	3,146	269	958	1,208	63	102,993
Location 35	University Road nearAShfaq Memorial Hospital	45008	887	20404	35980	1164	3270	359	1351	1500	12	109,935
Location 35	University Road nearAShfaq Memorial Hospital	39,546	732	19,073	50,413	395	1,446	216	708	1,421	381	114,331
Location 36	University Road Near Askari Park	13827	237	4201	16330	257	336	114	186	190	48	35,726
Location 37	University Road Near Safari Park	13,617	246	3,460	9,079	124	190	127	150	107	28	27,128
Location 38	University Road Near Rizwan Society	5207	131	1726	5529	95	112	47	70	131	23	13,071
Location 39	University Road near Karachi University	6,012	135	1,989	6,003	91	194	70	93	188	13	14,788
Location 40	New M A Jinnah Road near Islamia College	33669	633	15835	63808	393	0	432	483	204	15	115,472
Location 40	New M A Jinnah Road near Islamia College	23,228	424	10,357	33,307	297	0	245	399	249	9	68,515
Location 40	New M A Jinnah Road near Islamia College	39548	621	17110	65753	421	0	501	912	400	46	125,312
Location 41	Khayaban e Roomi Near Forum Mall	8,394	137	1,438	8,299	82	129	59	210	273	9	19,030
Location 42	M.A. Jinnah Road Near Tower	3306	86	1564	8705	333	325	119	80	64	6	14,588
Location 43	Moulvi Tameezuddin Khan road near Bahria Complex III	8,591	335	1,337	9,411	379	63	28	501	460	70	21,175
Location 44	Mauripur Road Near Wazir Mansion Station	4520	398	889	7921	489	350	65	479	851	1099	17,061
Total		804,278	25,673	323,983	1,392,924	28,738	39,960	17,792	29,480	44,412	11,086	2,718,326

Table 3.3: Classified Occupancy Counts Results Summary

Survey ID.	Location Name	Private Cars		Taxies		Auto Rickshaws		Motorcycle		Coaches		Mini Buses		Large Buses	
		Vehicles	Occupancy	Vehicles	Occupancy	Vehicles	Occupancy	Vehicles	Occupancy	Vehicles	Occupancy	Vehicles	Occupancy	Vehicles	Occupancy
Location 1	M.A Jinnah Road after Numaish	4,338	5,260	206	264	2,126	3,430	7,384	9,551	197	6,550	367	9,889	229	8,427
Location 2	Shahra e Quaideen near Allah Wali Chowrangi	7,848	11,582	154	288	1,887	2,691	6,549	8,263	119	1,867	226	3,389	11	208
Location 3	Shahra e Faisal near Karsaz	8,978	16,891	542	1,010	1,525	2,791	16,671	22,021	135	2,691	190	3,752	112	2,875
Location 4	Korangi Road near Akhter Colony	17,296	25,414	823	1,926	9,972	19,633	46,140	56,638	499	10,231	916	17,944	136	3,584
Location 4	Korangi Road near Akhter Colony	11,682	17,376	569	1,364	8,314	16,928	32,944	43,951	468	9,849	933	18,747	121	3,472
Location 4	Korangi Road near Akhter Colony	16,947	26,819	786	1,992	11,364	22,110	42,626	54,614	511	10,709	925	19,680	128	3,856
Location 5	Korangi Road near Shan Chowrangi	21,762	29,032	970	2,226	5,298	8,938	40,958	50,329	976	19,817	1,150	22,756	923	22,806
Location 5	Korangi Road near Shan Chowrangi	14,132	21,241	876	1,801	4,563	8,618	41,548	59,485	1,466	30,671	1,471	31,663	483	14,149
Location 5	Korangi Road near Shan Chowrangi	13,136	19,802	612	1,360	4,948	8,505	38,326	48,987	1,683	30,452	1,205	25,683	1,248	24,423
Location 5	Korangi Road near Shan Chowrangi	11,580	22,612	942	2,054	4,391	7,515	38,257	52,553	1,643	32,627	1,296	25,555	1,129	22,518
Location 5	Korangi Road near Shan Chowrangi	13,750	26,380	556	937	3,807	7,691	46,058	68,664	1,981	33,768	1,480	35,970	1,535	30,303
Location 5	Korangi Road near Shan Chowrangi	14,414	21,826	815	1,872	4,429	7,503	39,711	51,764	1,305	29,158	1,151	28,674	1,139	28,441
Location 5	Korangi Road near Shan Chowrangi	13,360	21,240	739	1,224	3,943	6,231	38,182	52,636	1,171	24,489	1,347	26,409	1,089	22,712
Location 6	Korangi Road near Awami Colony	4,471	8,745	185	386	824	1,675	13,007	17,514	225	4,071	528	7,361	223	5,085
Location 7	Korangi Road near Singer Chowrangi	2,046	2,792	135	235	517	864	11,011	14,103	325	4,688	139	2,299	229	5,433
Location 8	Landhi Industrial Area Road near Dawood Chowrangi	907	1,184	72	130	876	1,561	5,176	6,601	225	3,087	184	3,060	164	3,492
Location 9	Korangi Road near Kala Pull	3,729	5,340	57	108	975	1,851	7,825	10,146	172	3,611	463	9,165	117	3,417
Location 11	Shahra-e-Quaideen near Society Office	3,080	3,794	39	83	1,701	3,565	5,237	6,441	40	572	201	3,276	33	640
Location 12	Korangi Road near Shan Chowrangi	3,366	6,336	188	255	804	1,064	10,181	12,312	281	6,644	322	7,600	183	4,731
Location 13	Korangi Road near Mansehra Chowrangi	1,152	1,945	103	202	402	532	4,758	6,035	193	3,119	256	4,239	158	3,741
Location 14	Landhi Road	685	1,294	28	51	546	938	4,415	6,337	58	1,837	74	1,696	52	1,340
Location 15	Korangi Road near Nasir Colony	995	1,698	127	198	1,423	3,080	6,918	9,048	221	6,582	168	4,755	188	6,255
Location 16	Shah Faisal Town near Pak Sadaat Colony	3,647	5,390	139	329	1,130	3,605	16,126	21,410	-	-	-	-	200	5,148
Location 17	Shah Fraisal Colony near Natha Khan Brdige	22,442	39,181	604	1,356	1,397	2,707	31,440	37,381	152	2,246	344	5,711	253	4,715
Location 18	Malir Naddi Bridge Near Quaidabad	3,441	5,015	246	427	608	1,039	12,051	16,107	212	3,507	275	4,474	383	8,274
Location 19	Shaheed e Millat Expressway Near Manzoor Colony	7,639	14,864	122	239	1,284	2,184	7,417	9,426	76	1,855	158	3,961	26	656
Location 20	Korangi Road near Korangi Crossing	3,263	4,878	142	271	1,819	3,668	13,968	20,521	190	2,704	252	4,110	98	2,076
Location 21	Korangi Road after KPT Interchange	2,797	3,465	161	320	929	1,624	11,833	14,399	373	7,657	226	4,804	69	1,508
Location 22	M.A Jinnah Road near Jama Cloth	4,531	7,244	119	233	2,781	5,052	10,582	13,492	259	6,043	217	4,890	96	2,441
Location 23	Sir Shah Suleman Road Near Essa Nagri	8,484	14,008	224	287	2,412	3,147	12,222	14,508	135	2,663	391	8,021	97	2,448
Location 24	Karsaz Road near National Stadium	11,614	16,221	293	931	1,760	3,926	8,875	10,786	37	637	178	3,895	73	1,912
Location 25	Rashid Minhas Road near UBL Sports Complex	6,171	9,202	359	711	4,001	7,112	9,962	13,147	83	2,309	331	8,412	47	1,072
Location 26	Manghopir Road near Pakistan Quarters	1,050	1,447	75	126	1,885	3,741	5,258	7,045	148	3,878	77	2,158	82	2,671
Location 27	Mauripur Road Near Gulbai	2,044	3,852	120	352	719	1,689	6,447	9,709	198	4,719	246	5,670	48	1,195
Location 28	Shahrae Humayun Near Ayesha Manzil	7,317	13,700	317	557	4,303	6,524	17,254	21,761	85	1,378	152	2,535	341	6,243
Location 29	Manghopir Road near Metro Super Store	548	919	86	222	1,841	4,758	6,267	7,993	197	4,893	159	3,602	64	1,329
Location 30	N-25 Road Near Caltex pump	1,389	2,351	165	259	1,050	1,591	6,362	7,628	280	5,684	182	3,338	168	3,463
Location 31	Shahrae Usman Road Near Nagan Chowrangi	3,502	6,124	146	359	3,262	5,596	8,976	11,831	108	2,318	149	4,232	70	1,627
Location 32	New Karachi near Anda Morr	859	1,669	30	66	674	1,245	2,579	4,015	-	-	42	703	20	400
Location 33	Estate Avenue near Glaxo Smith Kline Industry	4,147	5,471	132	284	551	1,088	9,402	11,483	90	1,317	338	7,632	67	1,573
Location 34	Nazimabad near Baqai Hospital	4,497	6,264	113	235	2,924	7,398	10,221	14,278	50	975	113	2,792	156	3,574
Location 35	University Road nearAShfaq Memorial Hospital	24,174	48,792	671	941	12,984	21,201	46,947	63,446	355	8,714	1,396	32,573	168	4,448
Location 35	University Road nearAShfaq Memorial Hospital	24,831	56,070	797	1,989	13,754	34,404	27,410	49,174	848	22,559	2,302	48,336	232	6,879
Location 35	University Road nearAShfaq Memorial Hospital	30,640	57,288	987	2,467	13,709	31,378	33,844	56,548	907	24,357	2,217	56,678	268	8,273
Location 35	University Road nearAShfaq Memorial Hospital	27,405	49,301	821	2,298	12,995	27,848	31,663	47,962	903	19,317	2,396	47,768	269	6,466
Location 35	University Road nearAShfaq Memorial Hospital	24,733	50,656	587	1,387	10,486	21,878	26,257	45,922	907	21,828	2,641	59,230	222	5,681
Location 35	University Road nearAShfaq Memorial Hospital	29,714	50,638	725	1,472	13,746	29,188	23,919	42,271	945	24,018	2,744	60,718	304	7,510
Location 35	University Road nearAShfaq Memorial Hospital	27,283	44,448	574	1,162	14,204	26,375	32,143	52,389	362	9,869	1,273	28,949	214	5,331
Location 36	University Road Near Askari Park	12,088	18,813	215	374	3,808	6,530	14,694	18,991	239	3,667	328	5,338	111	2,289
Location 37	University Road Near Safari Park	12,789	21,874	209	344	3,222	6,381	8,530	10,171	117	2,529	179	3,944	124	3,312
Location 38	University Road Near Rizwan Society	4,880	9,364	112	188	1,549	2,550	5,138	6,254	89	1,781	107	2,211	44	1,040
Location 39	University Road near Karachi University	4,738	6,680	126	288	1,887	4,063	5,181	6,189	89	1,689	191	4,097	66	1,745
Location 40	New M A Jinnah Road near Islamia College	26,024	36,125	523	1,126	12,874	27,630	50,278	62,532	167	2,480	-	-	378	9,043
Location 40	New M A Jinnah Road near Islamia College	16,065	27,858	337	804	8,399	14,604	23,151	30,095	248	4,660	-	-	206	5,970
Location 40	New M A Jinnah Road near Islamia College	30,310	39,490	498	1,038	15,087	28,196	55,291	68,597	359	6,318	-	-	415	9,133
Location 41	Khayaban e Roomi Near Forum Mall	7,938	12,370	98	197	1,250	2,182	7,674	10,530	82	1,383	122	1,988	57	1,137
Location 42	M.A. Jinnah Road Near Tower	3,055	5,826	80	131	1,365	2,338	8,285	11,240	320	6,483	306	6,325	117	3,024
Location 43	Moulvi Tameezuddin Khan road near Bahria Complex III	7,636	9,391	320	596	1,173	1,877	7,469	8,823	366	8,515	63	1,374	28	576
Location 44	Mauripur Road Near Wazir Mansion Station	3,647	5,860	330	535	734	1,189	6,312	9,062	476	6,321	344	5,395	63	1,360
Total		606,986	1,010,712	21,127	44,867	253,191	495,220	1,125,310	1,535,109	24,346	508,361	35,431	759,426	15,274	357,450

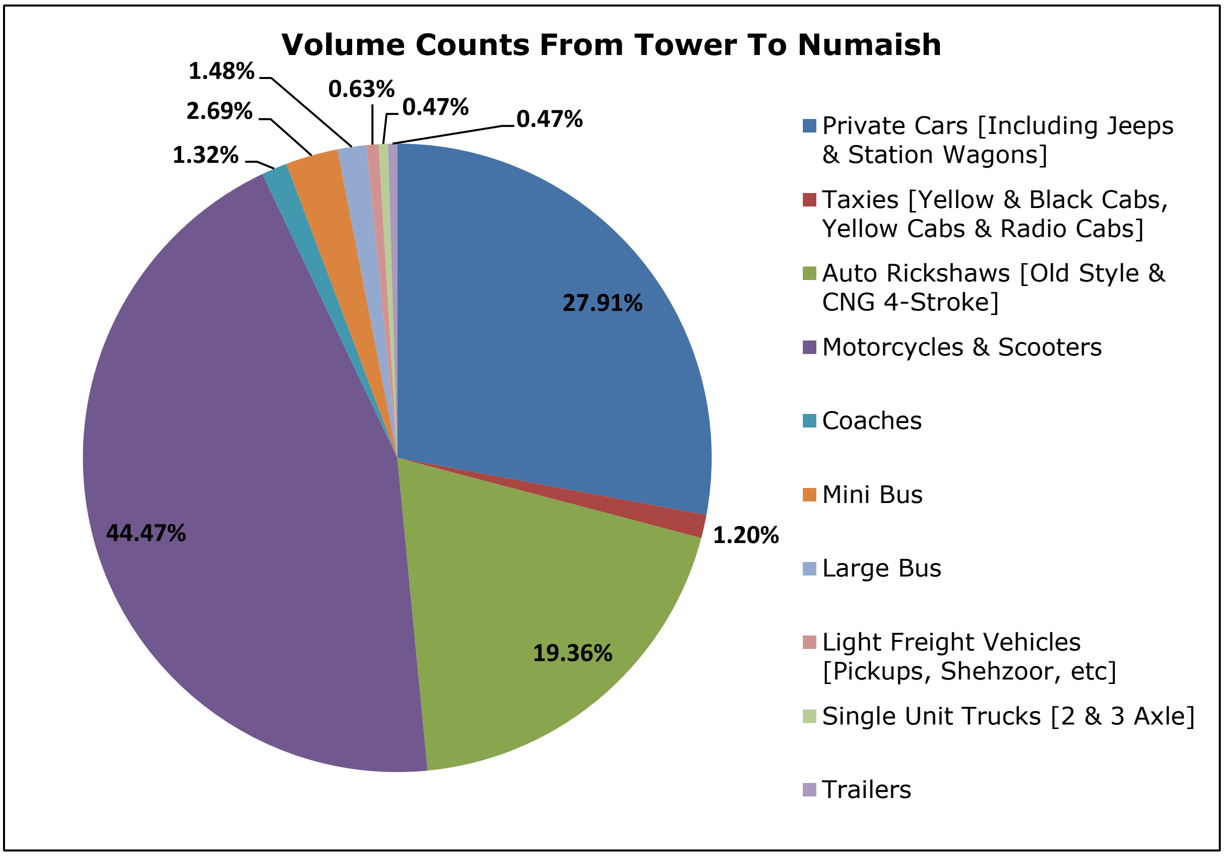


Figure 3.2: Volume Counts from Tower to Numaish (VC-01)

Motorcycles are the most predominant mode of transport in the entire area. Private cars are the second highest which makes around 28%. Public Transport (all types included) only makes 6% of vehicular mix which clearly suggests the depriving trend of Public Transport availability for the residents of Karachi. Para Transit including Taxi and Rickshaws makes around 21% of the total vehicular share. Freight Transport constitutes 1.5% of the total vehicular mix.

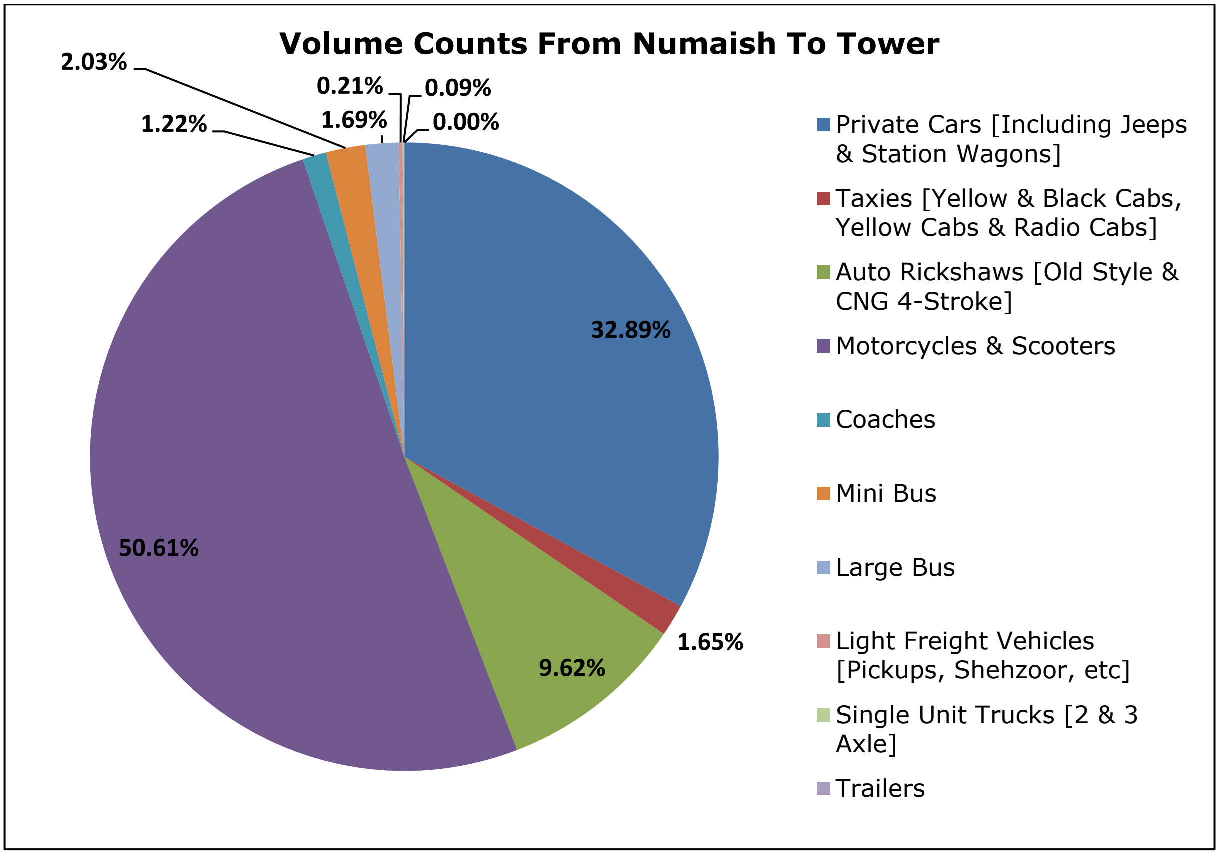


Figure 3.3: Volume Counts from Numaish to Tower (VC-01)

Motorcycles are the most predominant mode of transport in the entire area. Private cars are the second highest which makes around 33%. Public Transport (all types included) only makes 5% of vehicular mix which clearly suggests the depriving trend of Public Transport availability for the residents of Karachi. Para Transit including Taxi and Rickshaws makes around 12% of the total vehicular share. Freight Transport constitutes less than 1% of the total vehicular mix.

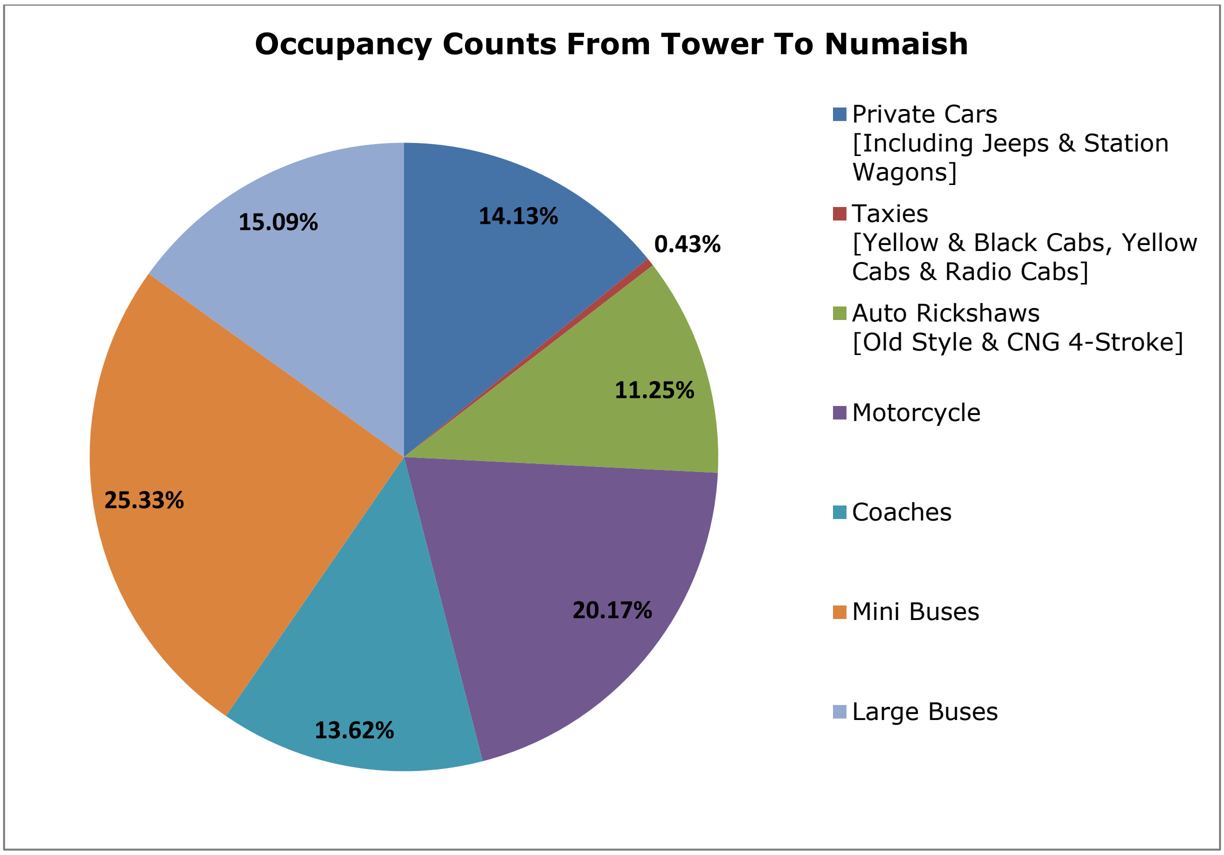


Figure 3.4: Occupancy Counts from Tower to Numaish (OC-01)

In this area occupancy rate for Mini Buses are very high around 26% Mini Bus pssengers counts in single direction from Tower to Numaish. Motorcycles are the second highest which makes around 21%. This indicates public transport Service in this area need to be optimized. Private Cars are 15% occupant. Para Transit including Taxi and Rickshaws makes fewer shares around 12%.

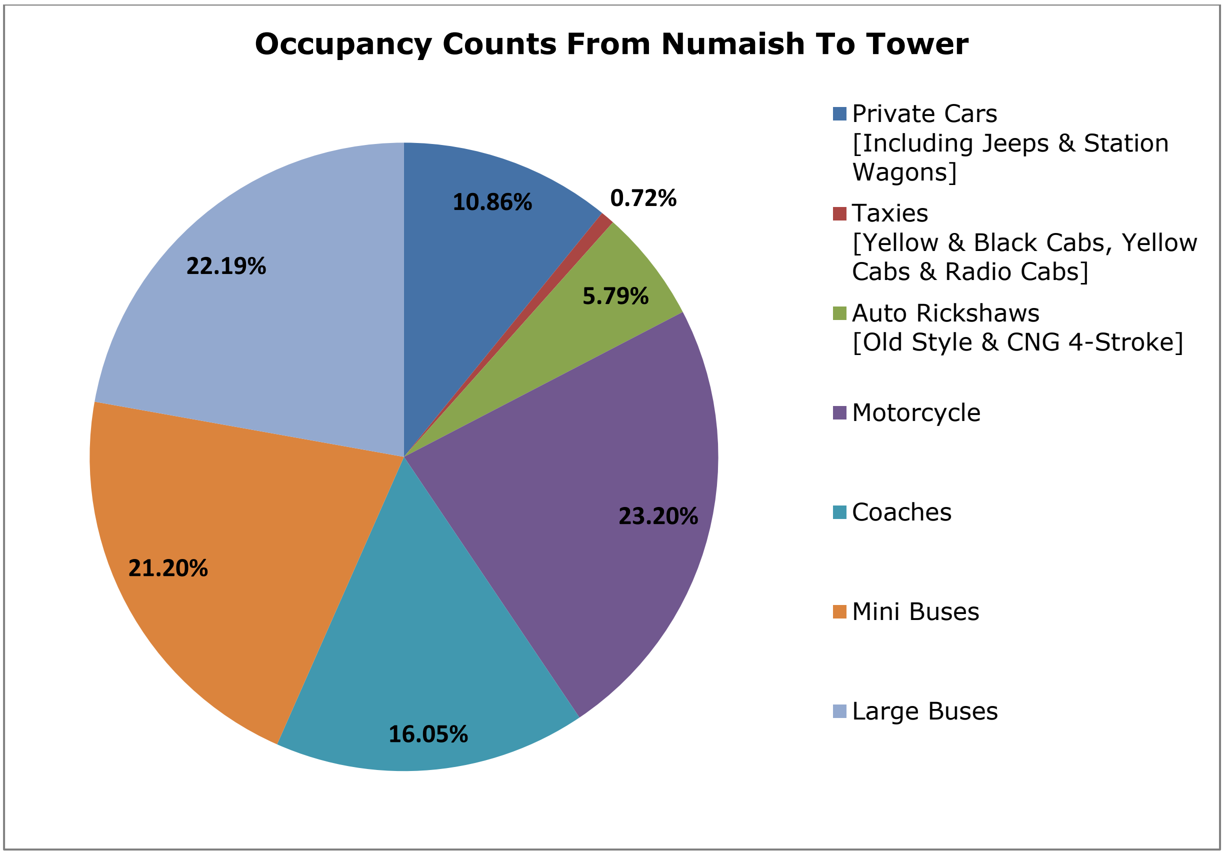


Figure 3.5: Occupancy Counts from Numaish to Tower (OC-01)

From Numaish to Tower, 24% Motorcycle Occupancy Rate and Large Buses are the second highest which makes around 23%. Mini Buses are 22% occupant. Private Cars constitutes 11% also Para Transit including Taxi and Rickshaws makes fewer shares around 7%.

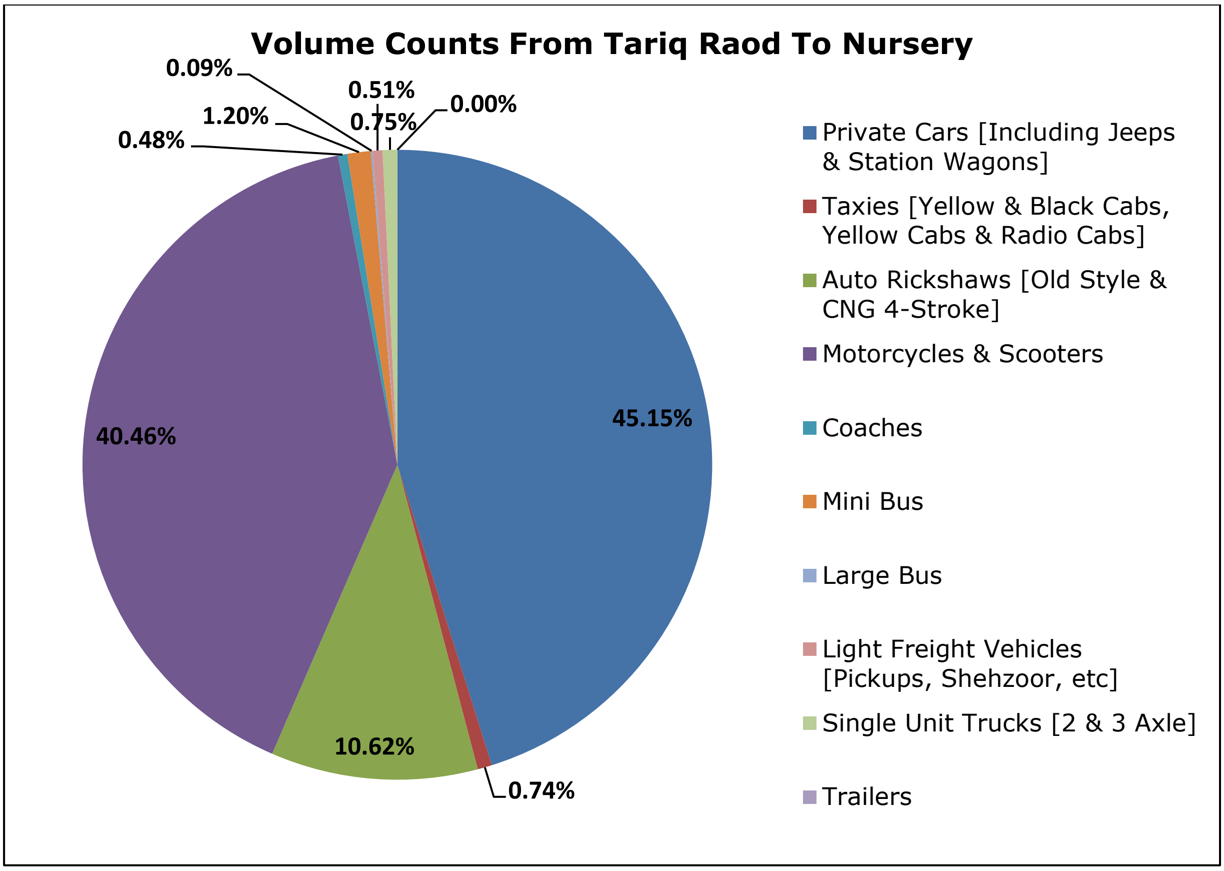


Figure 3.6: Volume Counts from Nursery to Tariq Road (VC-02)

At this particular location Private Cars constitutes around 46% whereas Motorcycles are almost 41% of the total modal split. Para transit includes Auto Rickshaws and Taxies have less modal share at this location which constitutes around 12%. Public Transport and Light Freight Vehicles are in very low numbers in this segment of Tariq Road to Nursery which combined sums up to just 3% of the total vehicular mix.

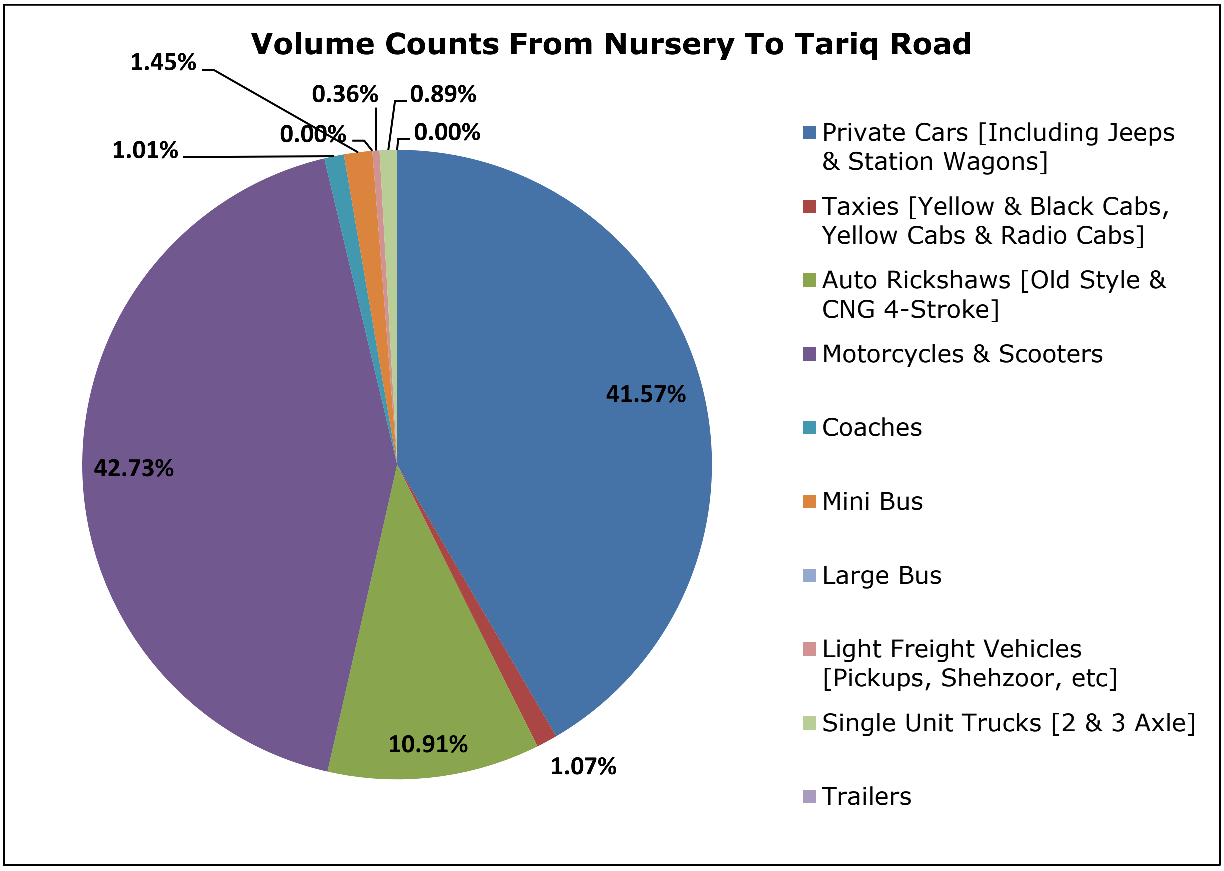


Figure 3.7: Volume Counts from Nursery to Tariq Road (VC-02)

At this particular location Motorcycles constitutes around 43% whereas Private Cars are almost 42% of the total modal split. Para transit includes Auto Rickshaws and Taxies have less modal share at this location which constitutes around 12%. Public Transport and Light Freight Vehicles are in very low numbers in this segment of Tariq Road to Nursery which combined sums up to just 4% of the total vehicular mix.

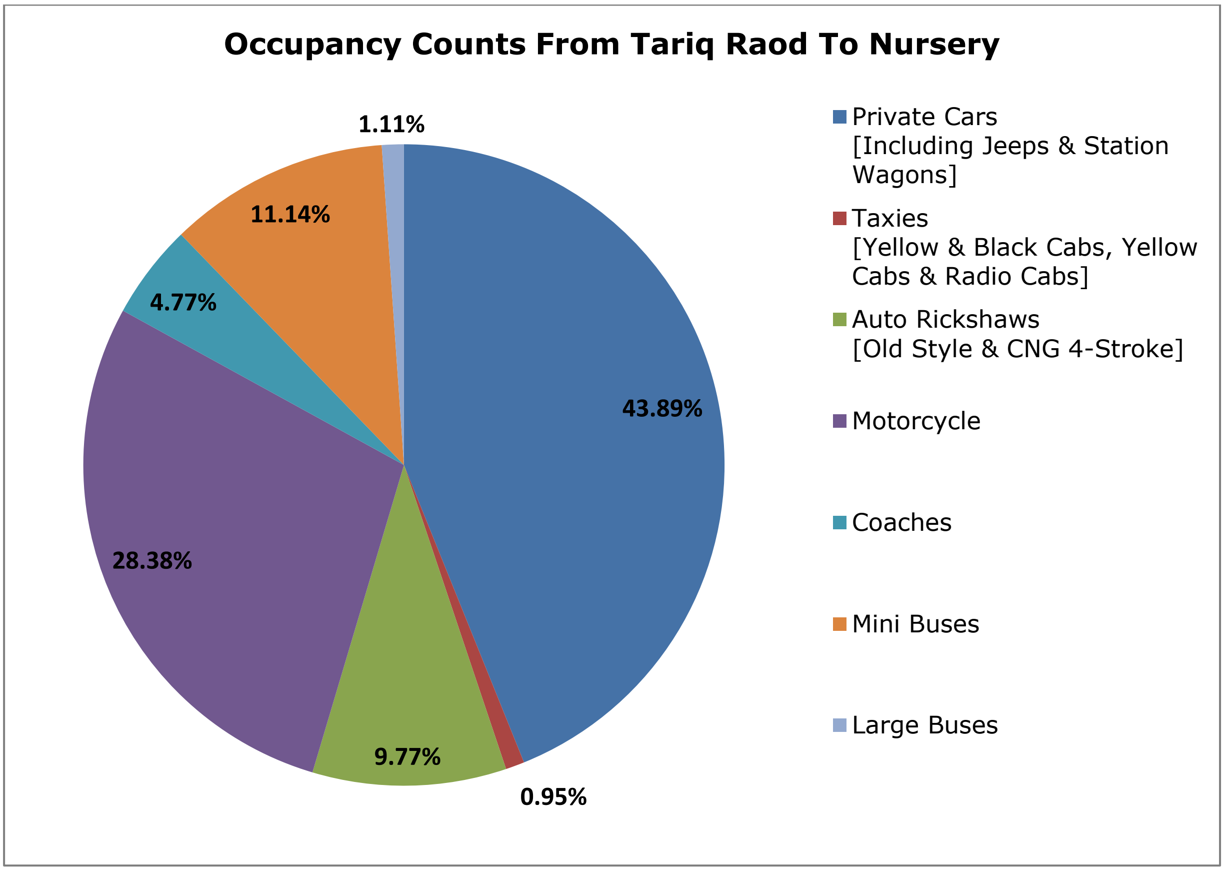


Figure 3.8: Occupancy Counts from Tariq Road to Nursery (OC-02)

In this area occupancy rate for Private Cars are very high around 44% passengers counts in single direction from Tariq Road to Nursery and Motorcycles are the second highest which makes around 29%. Public Transport is 17% occupant. Para transit makes fewer shares around 11%.

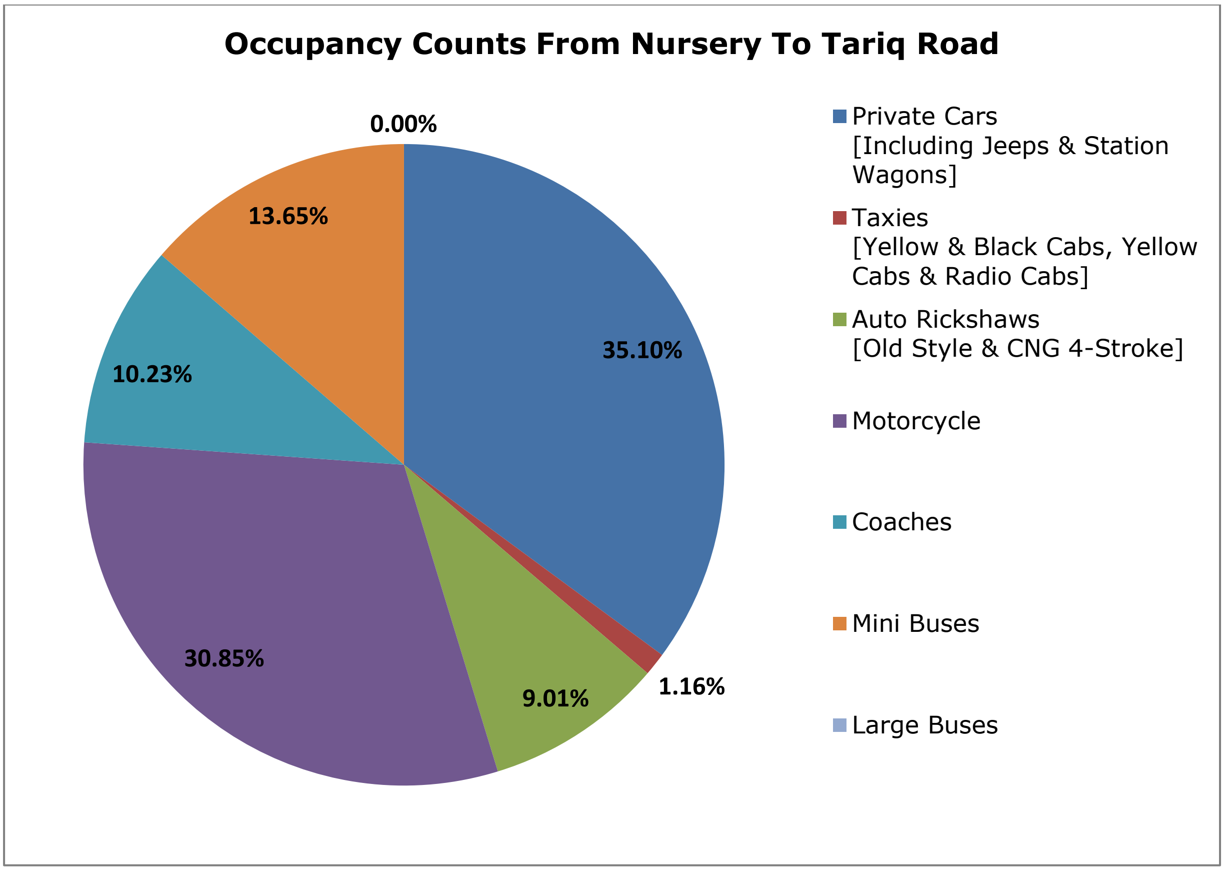


Figure 3.9: Occupancy Counts from Nursery to Tariq Road (OC-02)

In this area occupancy rate for Private Cars are very high around 36% passengers counts in single direction from Nursery to Tariq Road and Motorcycles are the second highest which makes around 31%. Public Transport is 24% occupant. Para transit makes fewer shares around 11%.

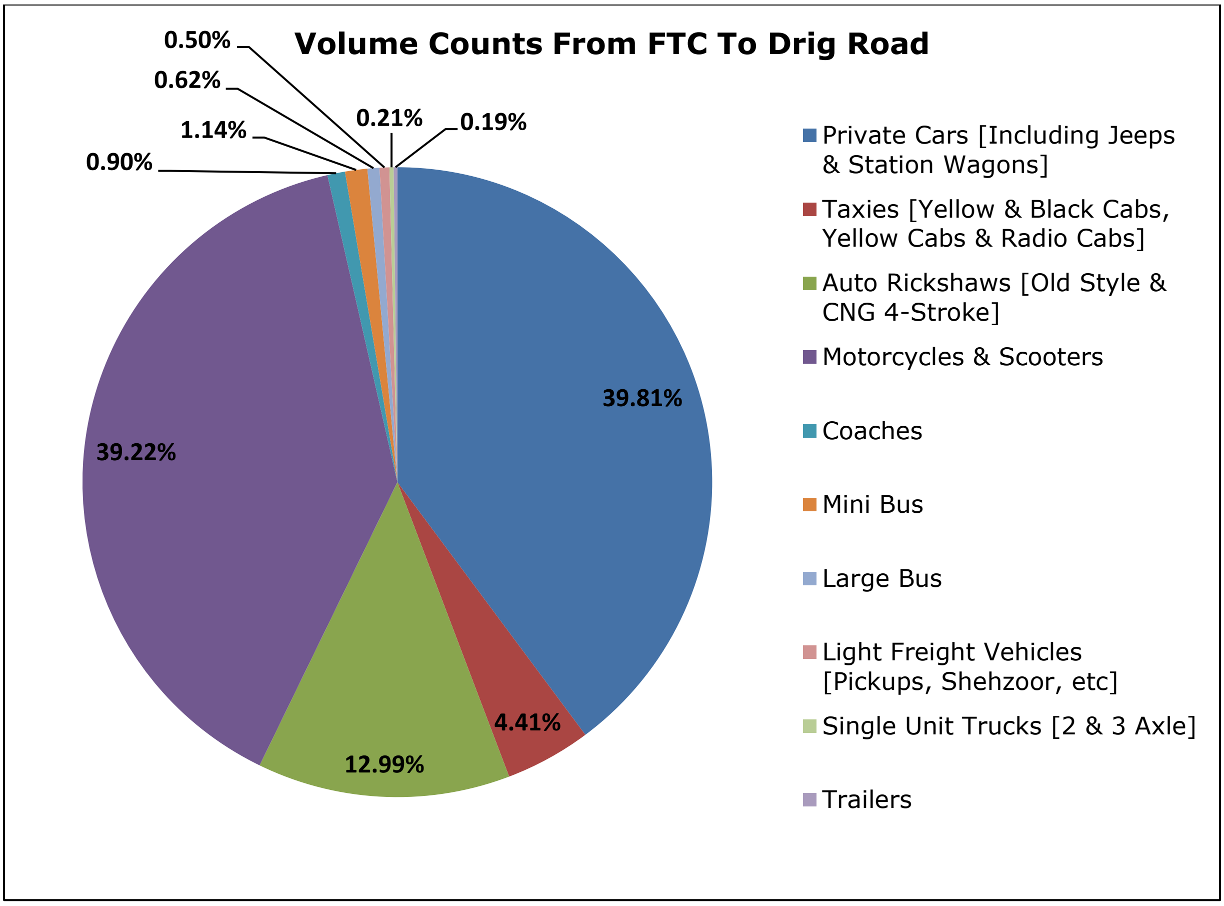


Figure 3.10: Volume Counts from FTC to Drig Road (VC-03)

Private Cars constitutes the highest percentage of modal share which is 40% of the total and if Motorcycles be included which is 39% it makes more than three quarter of the total modal split which clearly suggests that the private vehicle dependency is very high. Para Transit constitutes around 17% of the vehicular mix. Public and freight Transport collectively form 4% of vehicular traffic which is on a very lower side.

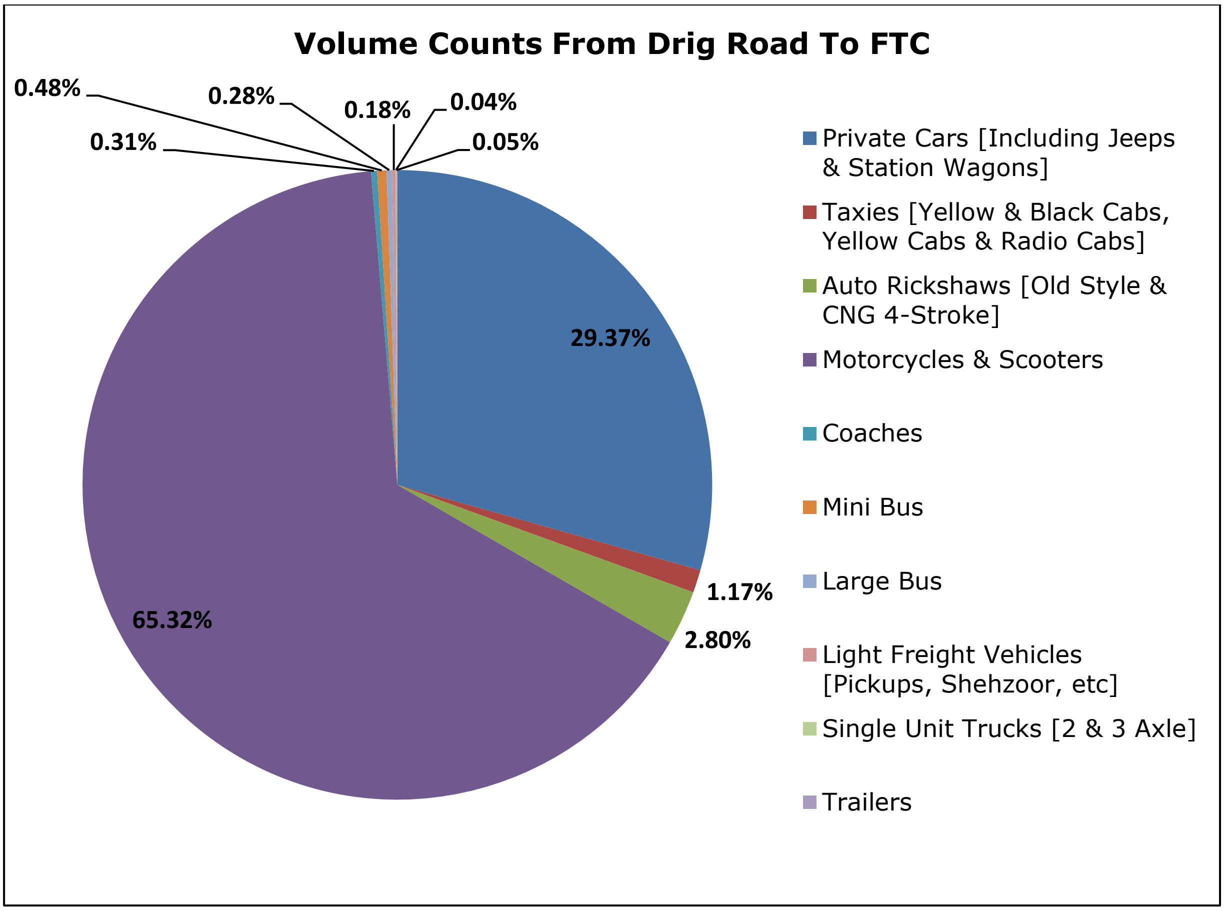


Figure 3.11: Volume Counts from Drig Road to FTC (VC-03)

Motor cycles constitutes the highest percentage of modal share which is 65% of the total and if cars be included which is 30% it makes more than three quarter of the total modal split which clearly suggests that the private vehicle dependency is very high. Para Transit constitutes around 5% of the vehicular mix. Public and freight Transport collectively form 2% of vehicular traffic which is on a very lower side.

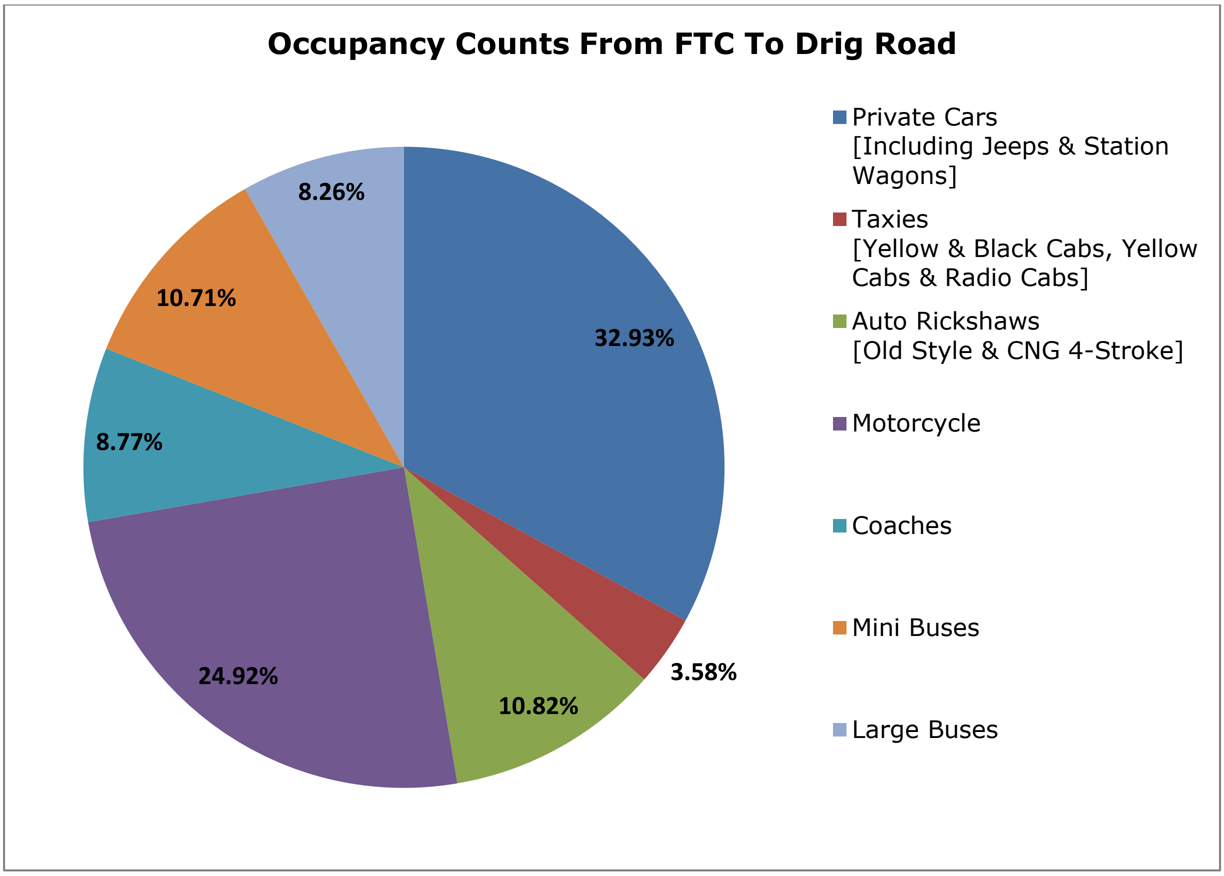


Figure 3.12: Occupancy Counts from FTC to Drig Road (OC-03)

In this area occupancy rate for Private car is very high around 33% customer's counts in single direction from FTC to Drig Road and Motorcycle are the second highest which makes around 25%. Public Transport is 28% occupant. Para Transit makes fewer shares around 15%.

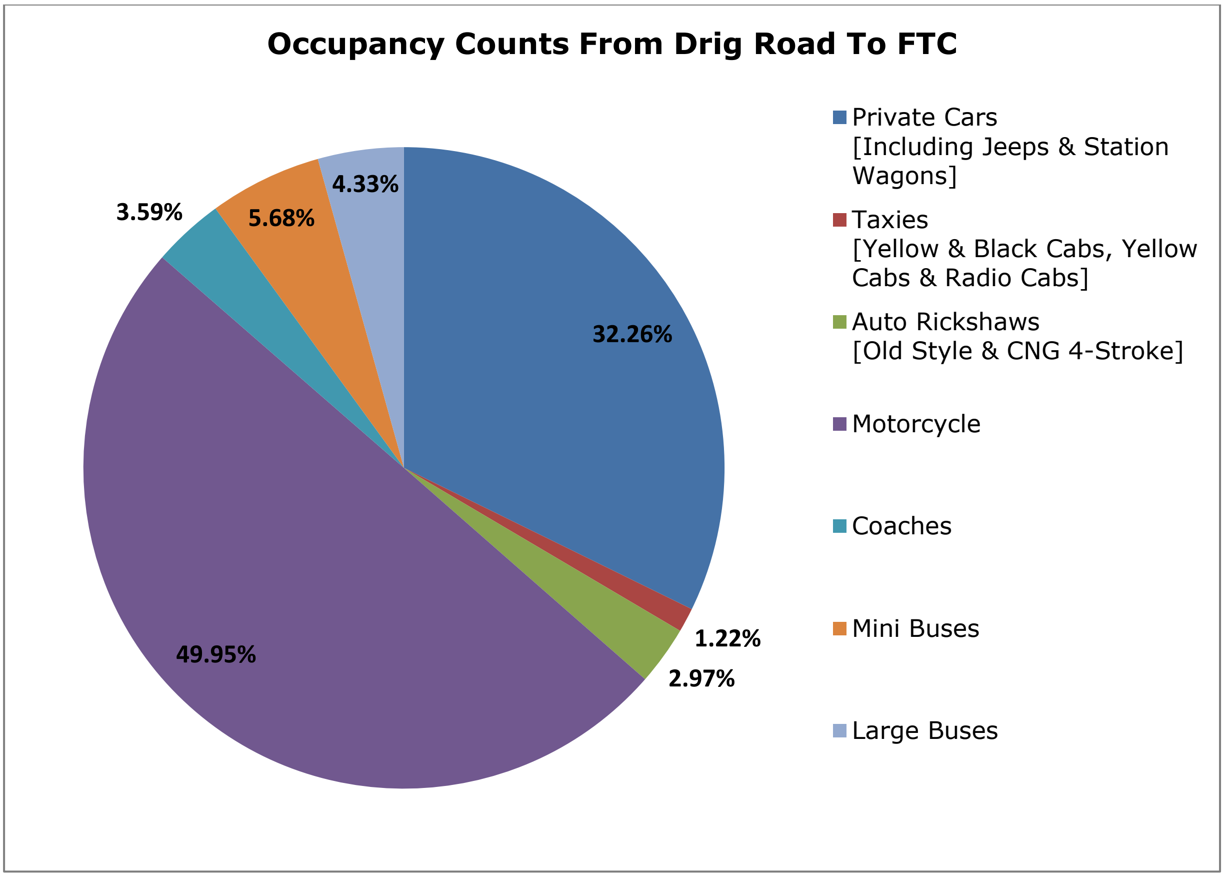


Figure 3.13: Occupancy Counts from Drig Road to FTC (OC-03)

In this area occupancy rate for Motorcycle is very high around 50% customer's counts in single direction from Drig Road to FTC and Private car are the second highest which makes around 33%. Public Transport is 14% occupant. Para Transit makes fewer shares around 5%.

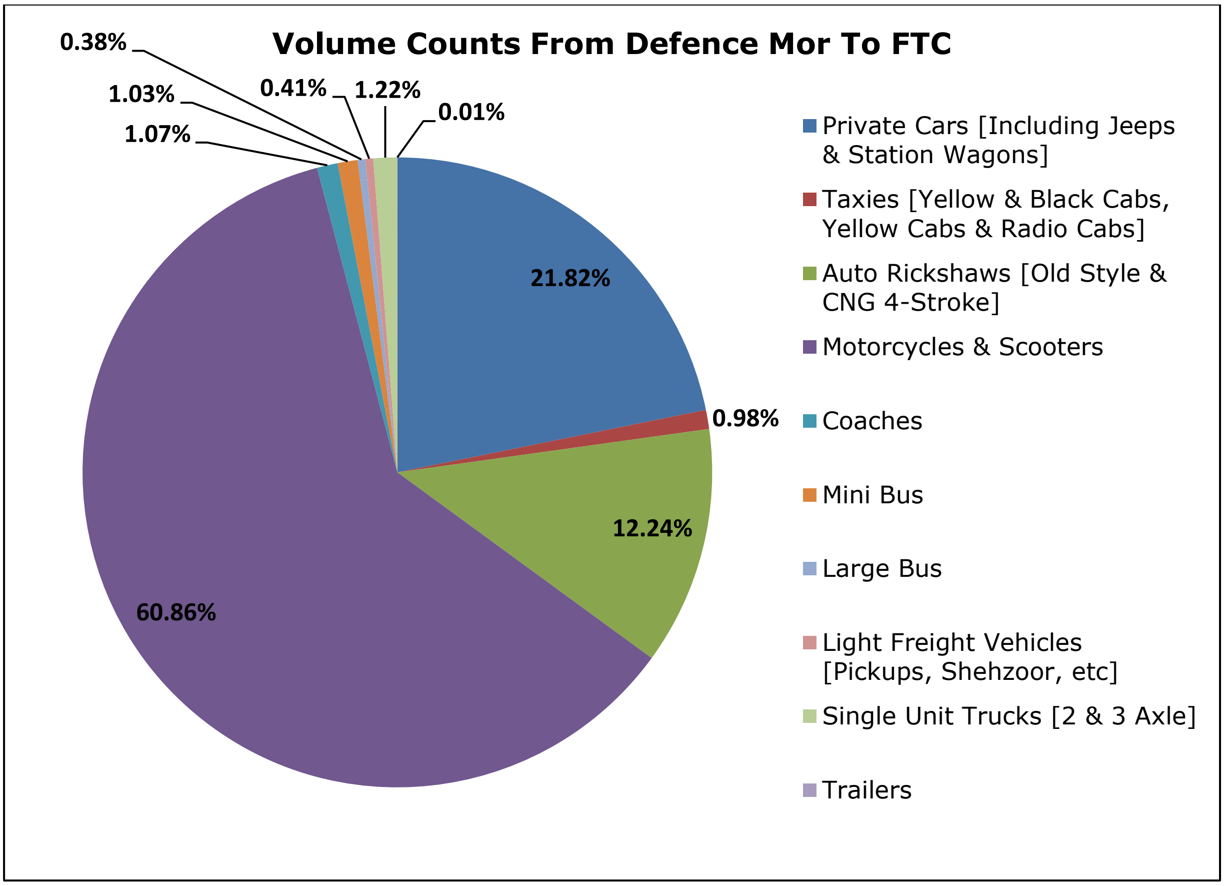


Figure 3.14: Volume Counts from Defence Mor to FTC (Weekday) - (VC-04)

In Average Weekday, Motorcycles are the predominant mode of transport in the entire area. Private cars are the second highest which makes around 22%. Para Transit makes around 13% of the total vehicular share. Rest of model share is Public Transport includes all types i.e. Coaches, Mini Bus & Large Bus and Freight Transport which shares less than 5% respectively.

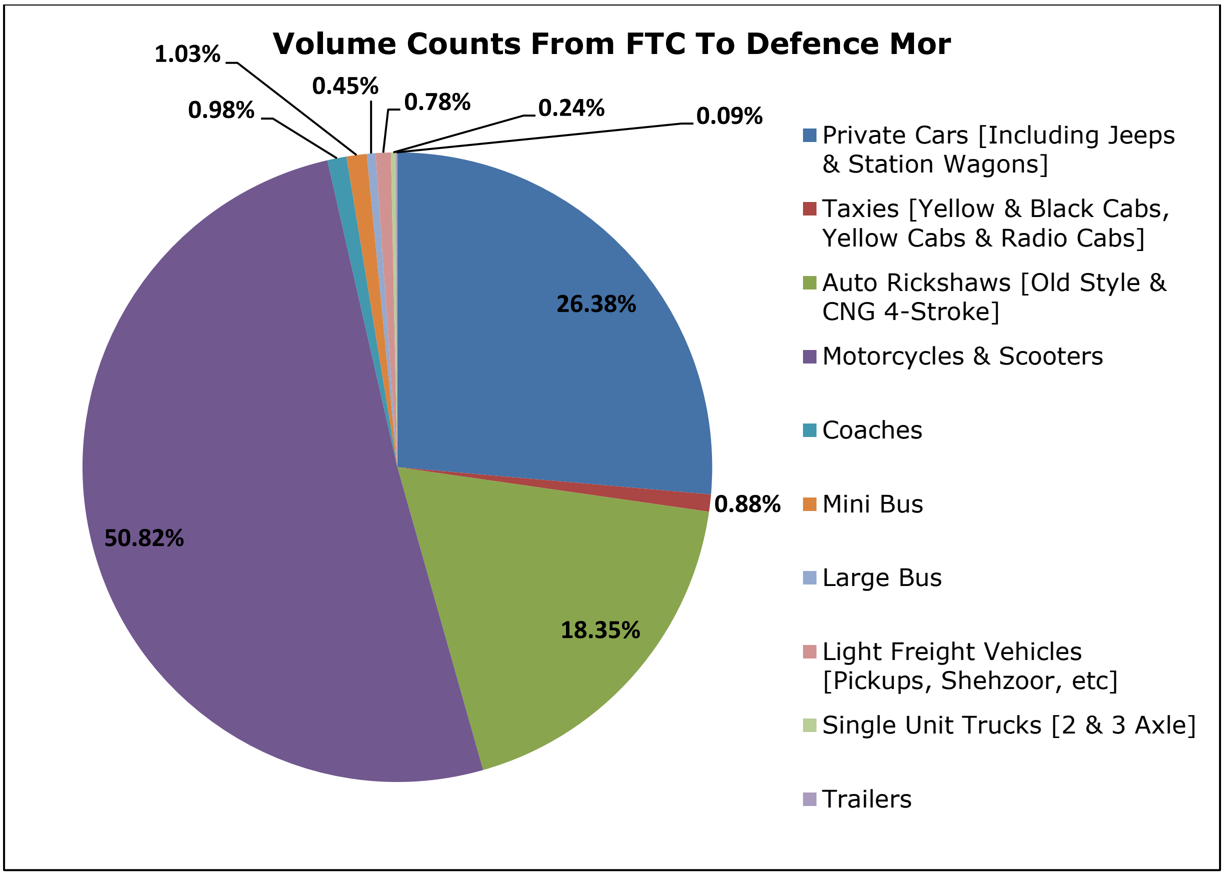


Figure 3.15: Volume Counts from FTC to Defence Mor (Weekday) - (VC-04)

In Average Weekday, Motorcycles are the predominant mode of transport in the entire area. Private cars are the second highest which makes around 27%. Para Transit makes around 19% of the total vehicular share. Rest of model share is Public Transport includes all types i.e. Coaches, Mini Bus & Large Bus and Freight Transport which shares less than 3% respectively.

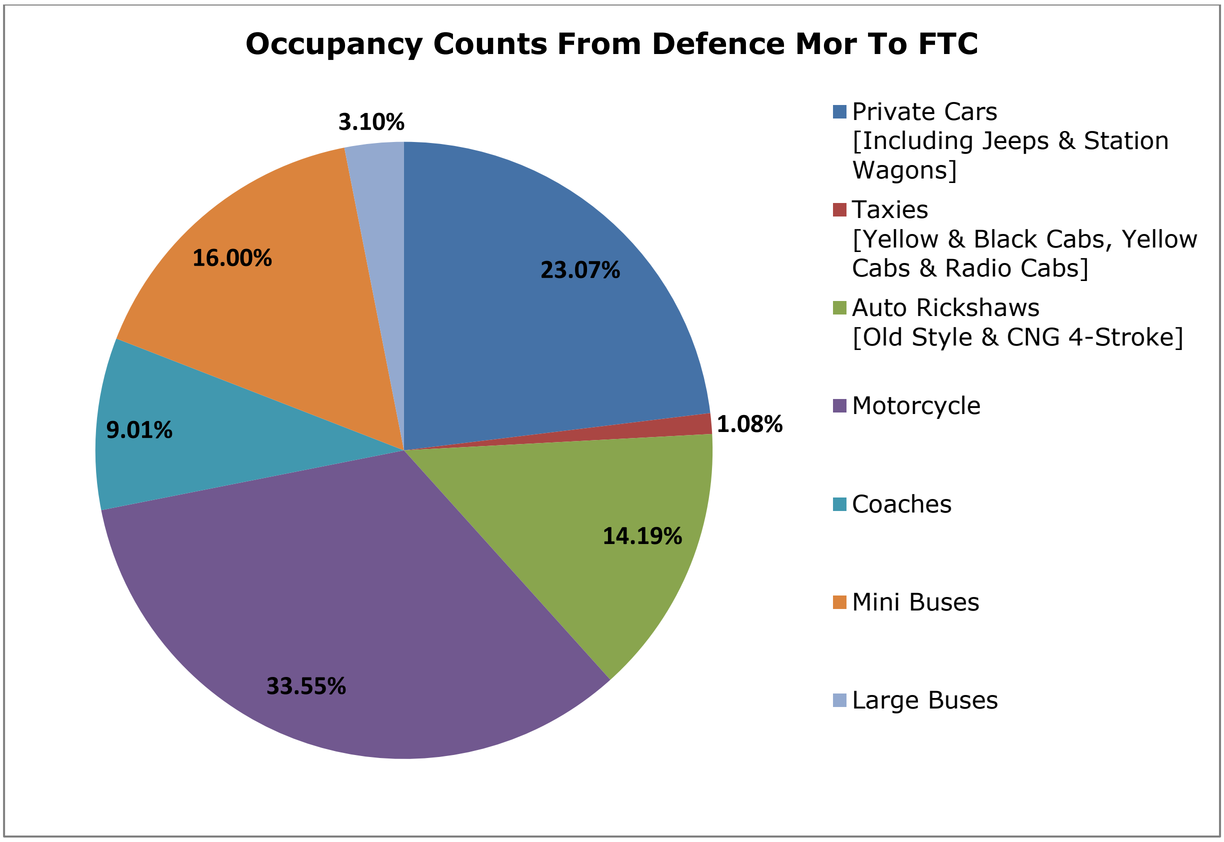


Figure 3.16: Occupancy Counts Defence Mor to FTC (Weekday) - (OC-04)

In Average Weekday, in this area occupancy rate for Motorcycle is very high around 33.5% customer's counts in single direction from Defence Mor to FTC. Public Transport is the second highest which makes around 28%. Private cars make fewer shares around 23.07%. Para Transit is 15% occupant.

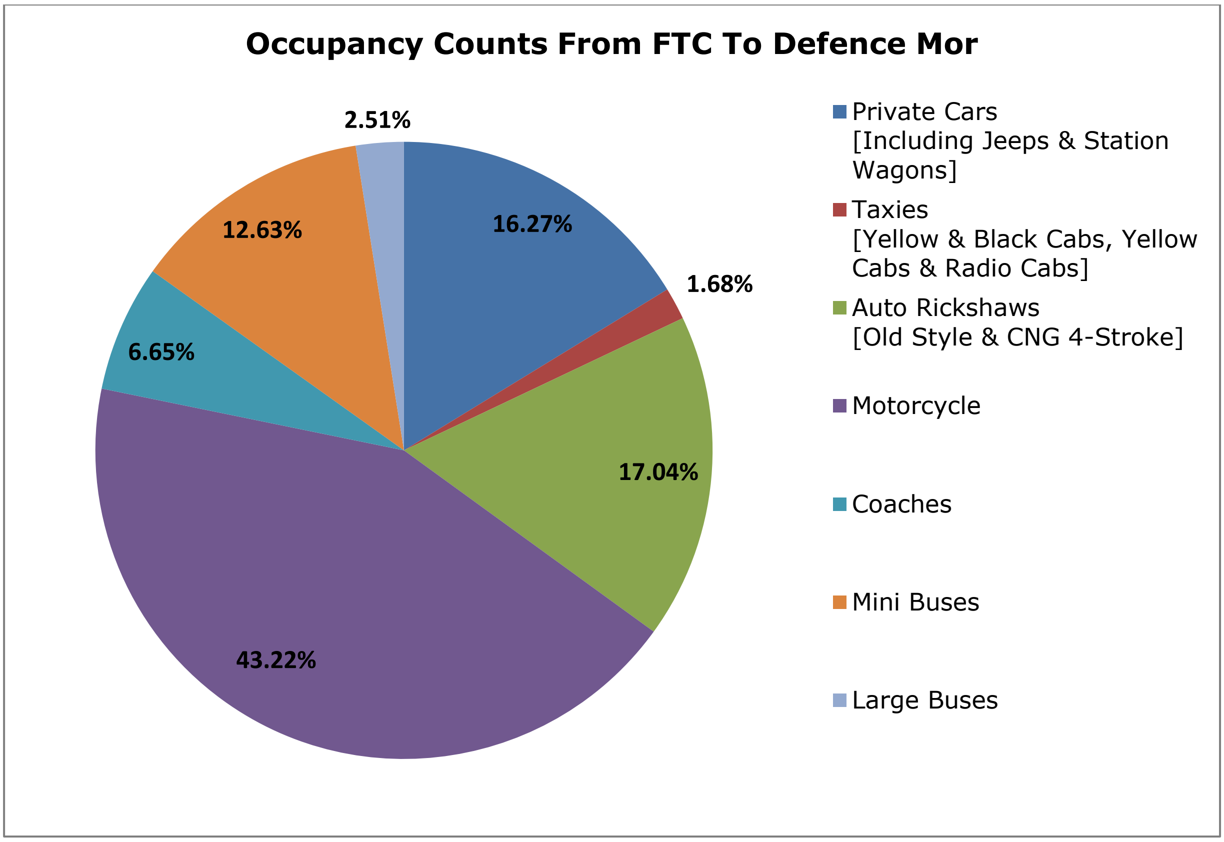


Figure 3.17: Occupancy Counts from FTC to Defence Mor (Weekday) - (OC-04)

In Average Weekday, in this area occupancy rate for Motorcycle is very high around 43.2% customer's count in single direction from FTC to Defence Mor. Public Transport is the second highest which makes around 22%. Private cars make fewer shares around 16%. Para Transit is 19% occupant.

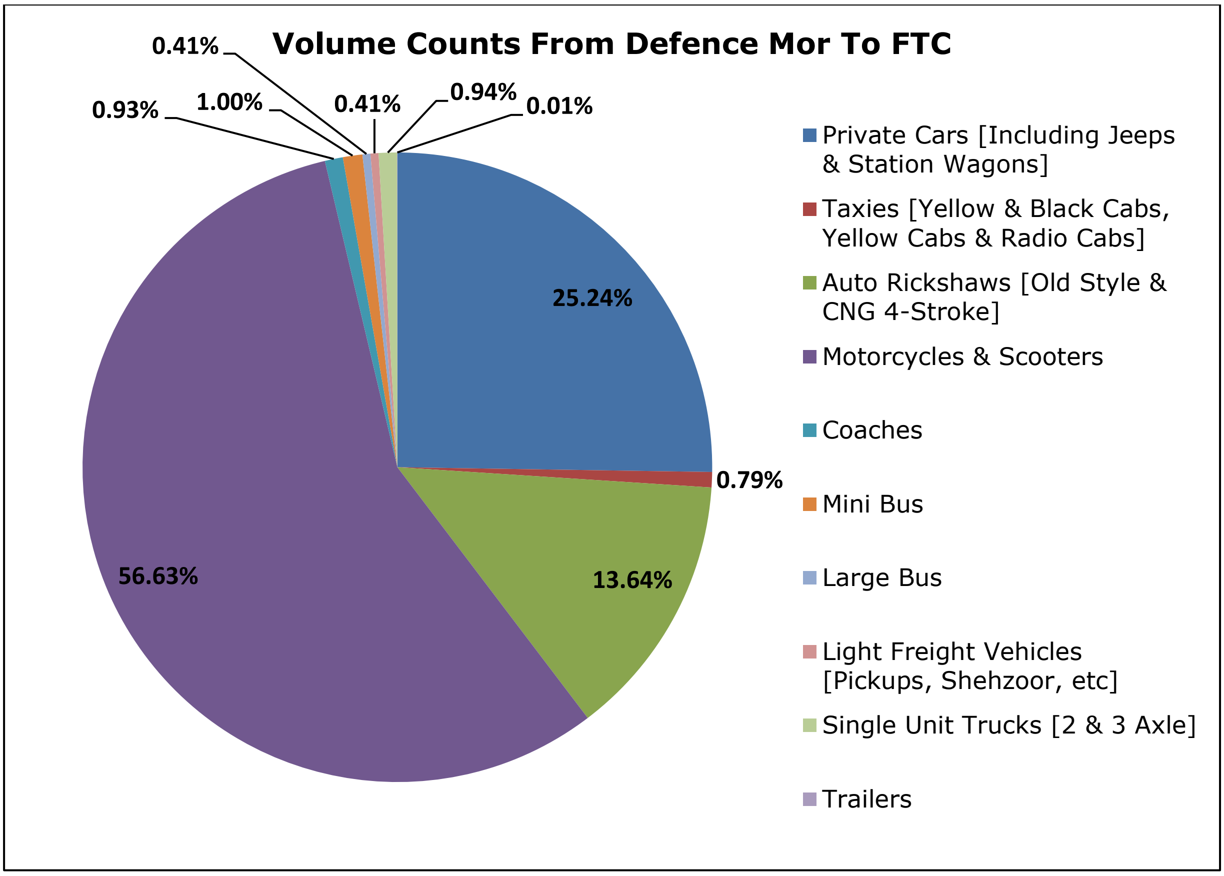


Figure 3.18: Volume Counts from Defence Mor to FTC (Weekend) - (VC-04)

On Average Weekend, in this segment of Defence Mor to FTC, Private Cars are in high number which constitutes around 25% but Motorcycles still leads the modal share with 57% of the total. Out of other modal classifications, Para transit Includes Taxies and Rickshaws have 15% share, Public Transport includes Coaches, Mini Bus and Large bus have 3% share in terms of modal split and Frieght vehicles are less than 2% modal share.

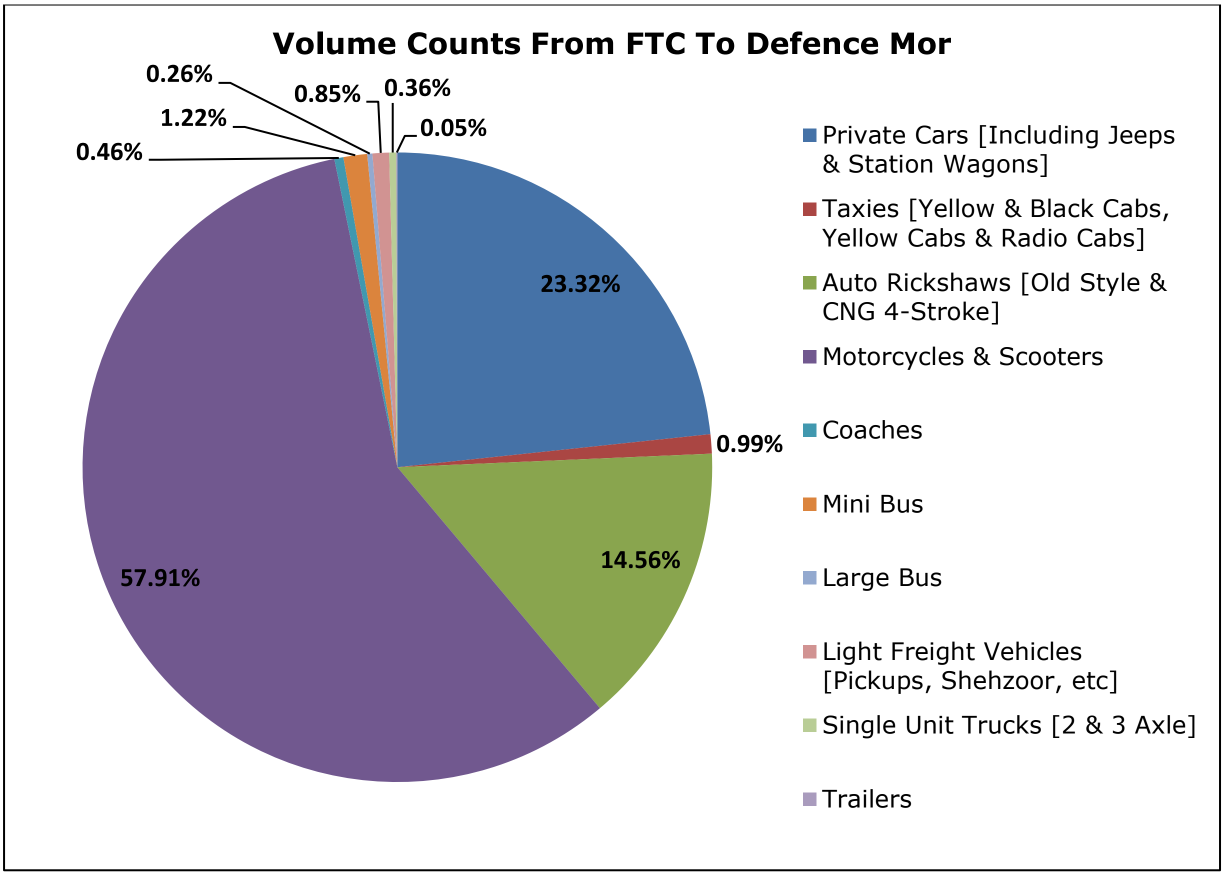


Figure 3.19: Volume Counts from FTC to Defence Mor (Weekdend) - (VC-04)

On Average Weekend, in this segment of FTC to Defence Mor, Private Cars are in high number which constitutes around 23% but Motorcycles still leads the modal share with 58% of the total. Out of other modal classifications, Para transit Includes Taxies and Rickshaws have 16% share, Public Transport includes Coaches, Mini Bus and Large bus have 3% share in terms of modal split and Frieght vehicles are less than 2% modal share.

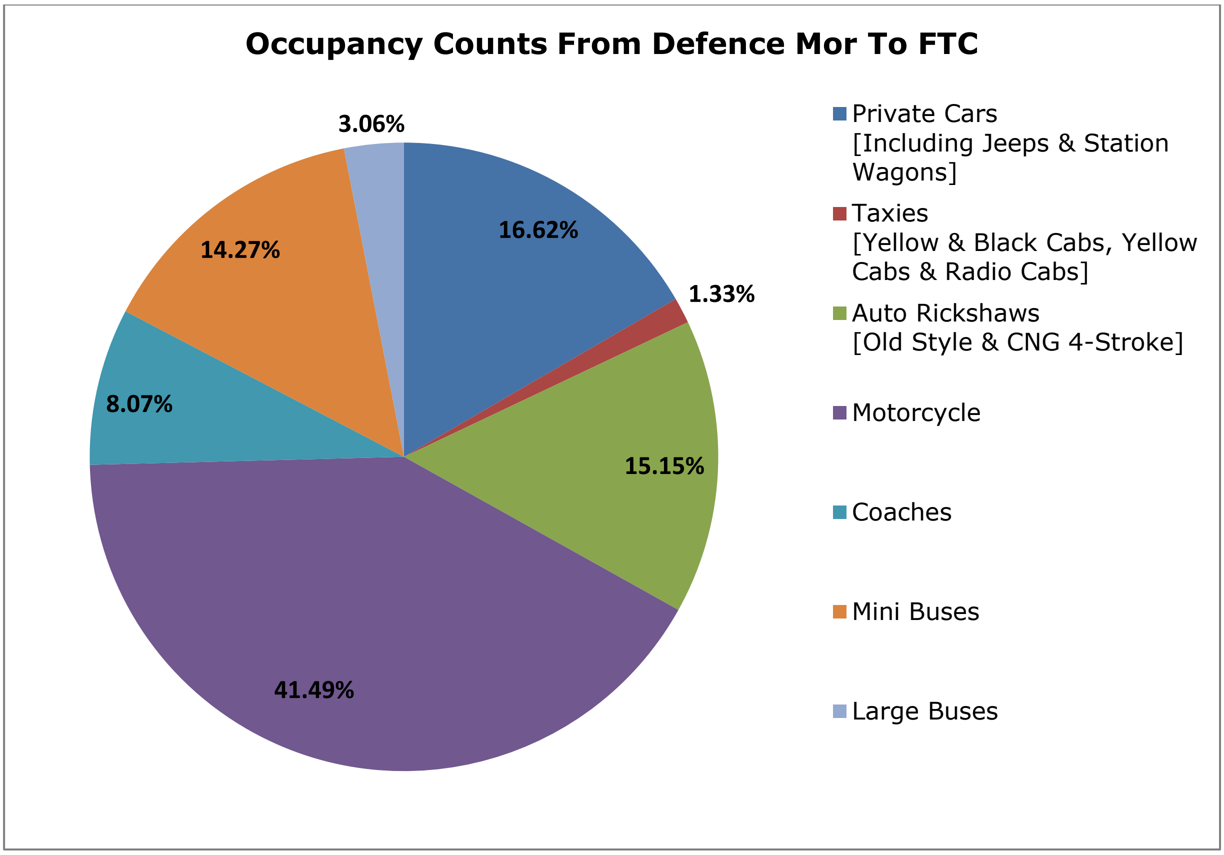


Figure 3.20: Occupancy Counts from Defence Mor to FTC (Weekend) - (OC-04)

On Average Weekdend, occupancy rate for Motorcycle is very high around 41.4% passengers counts in single direction from Defence Mor to FTC. Public Transport is the second highest which makes around 25%. Private cars are 16.6% occupant. Para Transit makes fewer shares around 16%.

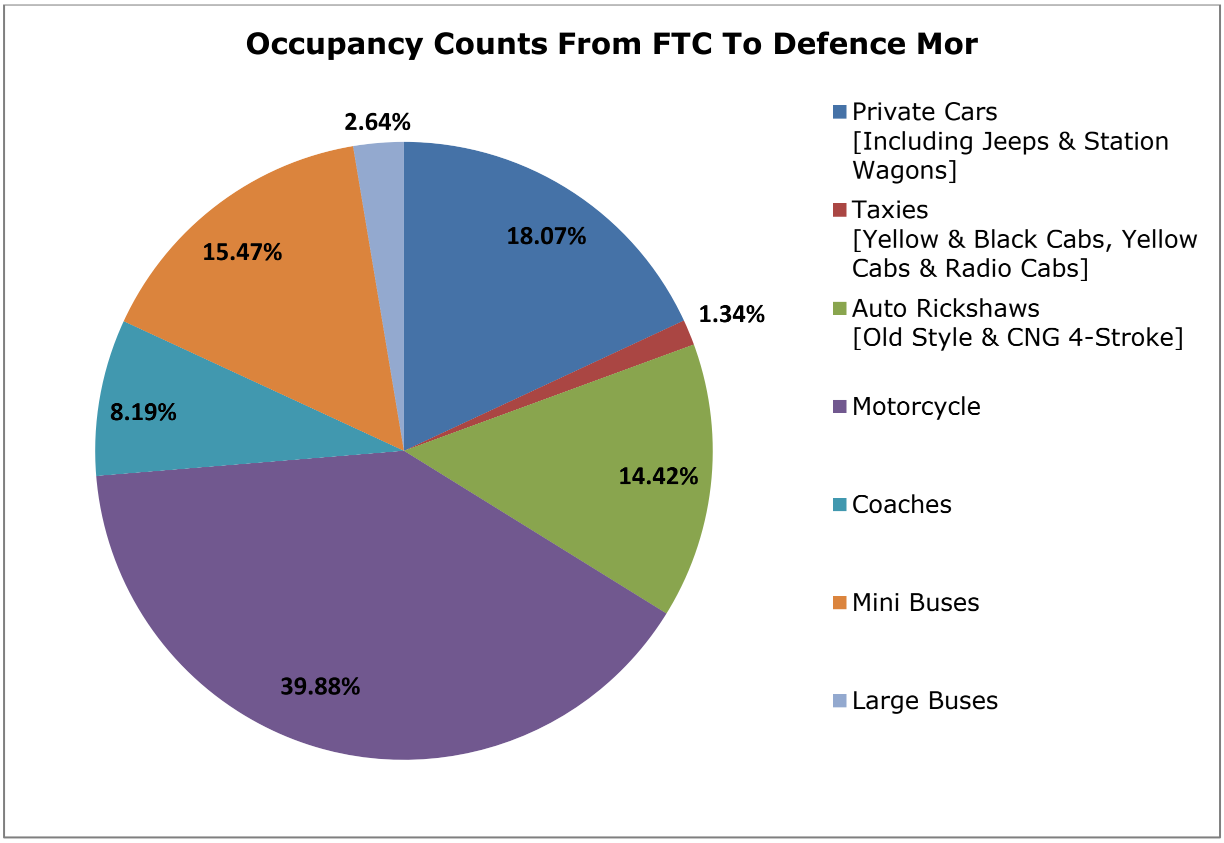


Figure 3.21: Occupancy Counts from FTC to Defence Mor (Weekend) - (OC-04)

On Average Weekdend, occupancy rate for Motorcycle is very high around 39.8% passengers counts in single direction from FTC to Defence Mor. Public Transport is the second highest which makes around 26.3%. Private cars are 18% occupant. Para Transit makes fewer shares around 16%.

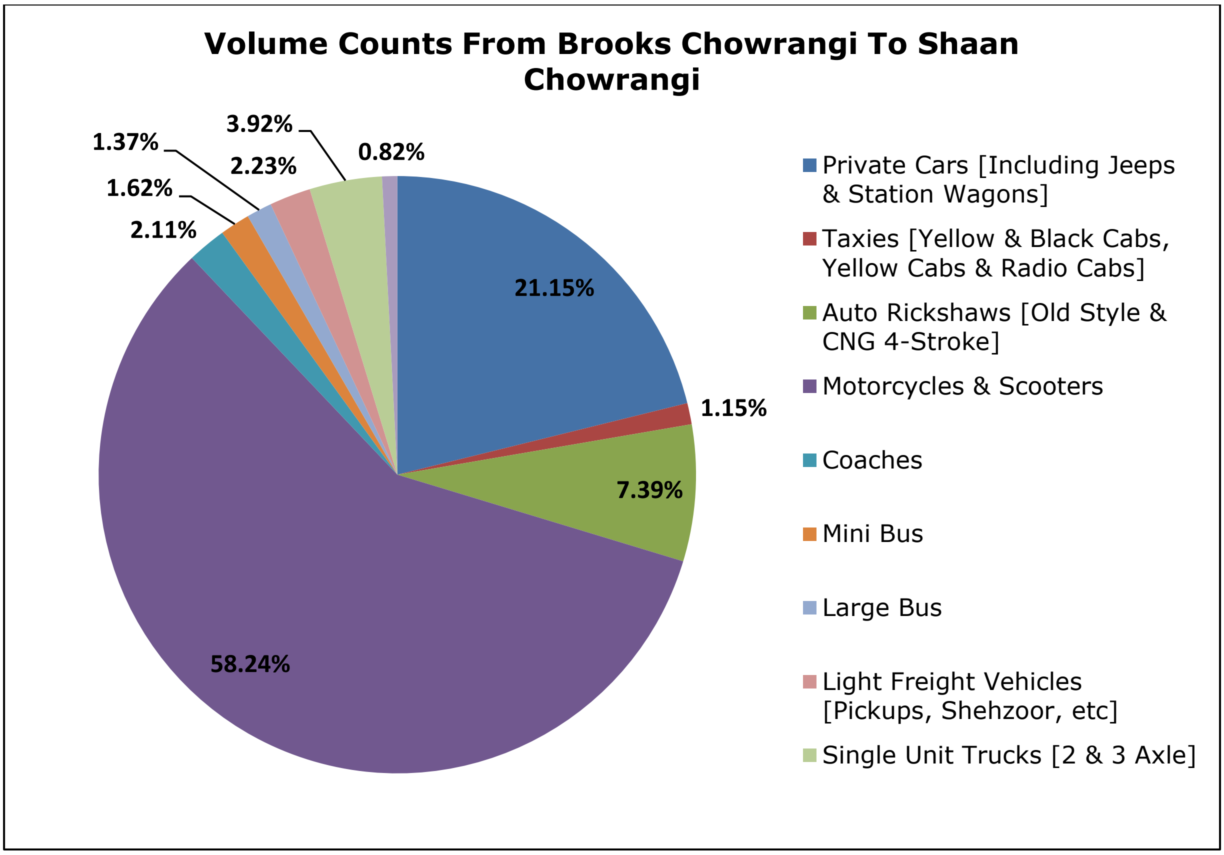


Figure 3.22: Volume Counts from Brooks Chowrangi to Shaan Chowrangi (Weekday) - (VC-05)

In Average Weekday, at this particular location Motorcycles constitutes around 58% whereas Private Cars are almost 21% of the total modal split. Auto Rickshaws has a high modal share at this location which constitutes around 8% as compared to Taxis that are 1%. Public Transport and Freight Vehicles are in very low numbers in this segment and their combined sums up to just 11% of the total vehicular mix.

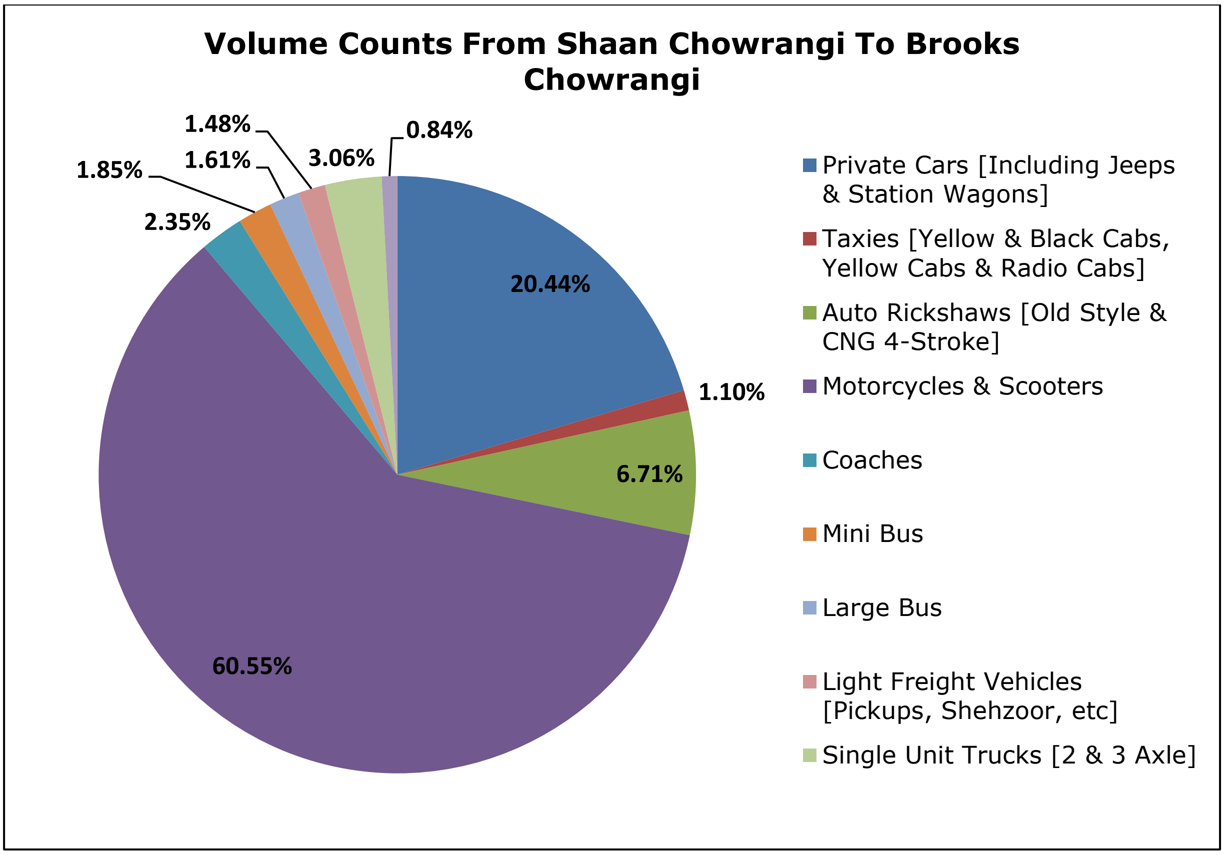


Figure 3.23: Volume Counts from Shaan Chowrangi to Brooks Chowrangi (Weekday) - (VC-05)

In Average Weekday, at this particular location Motorcycles constitutes around 61% whereas Private Cars are almost 21% of the total modal split. Auto Rickshaws has a high modal share at this location which constitutes around 7% as compared to Taxis that are 1%. Public Transport and Freight Vehicles are in very low numbers in this segment and their combined sums up to just 11% of the total vehicular mix.

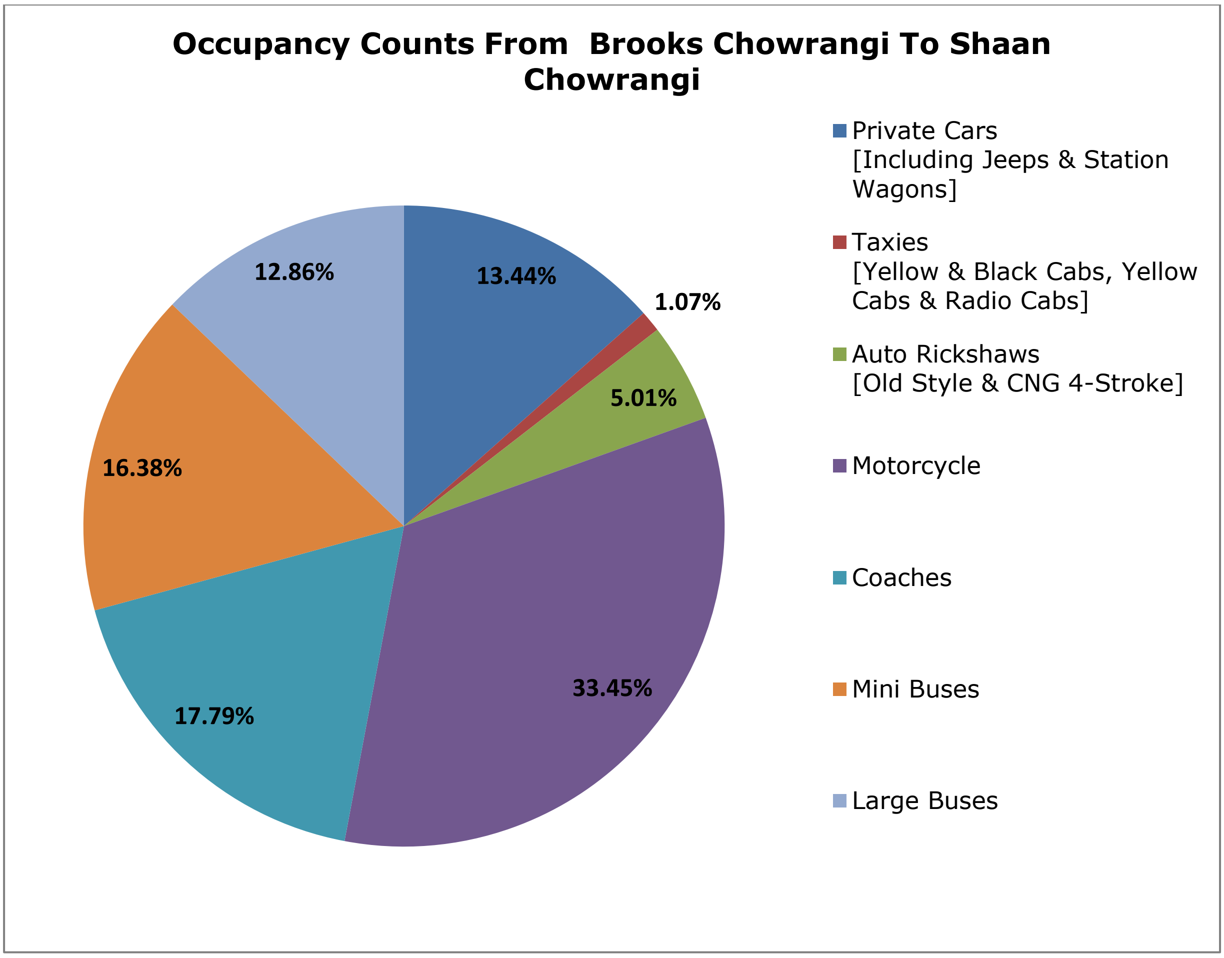


Figure 3.24: Occupancy Counts from Brooks Chowrangi to Shaan Chowrangi (Weekend) - (OC-05)

In Average Weekday, occupancy rate for Public Transport is very high around 46.9% passengers counts in single direction from Brooks Chowrangi to Shaan Chowrangi. Motorcycles makes 34% share whereas Private Cars Constitutes 13% occupancy. Para Transit makes fewer shares around 6%.

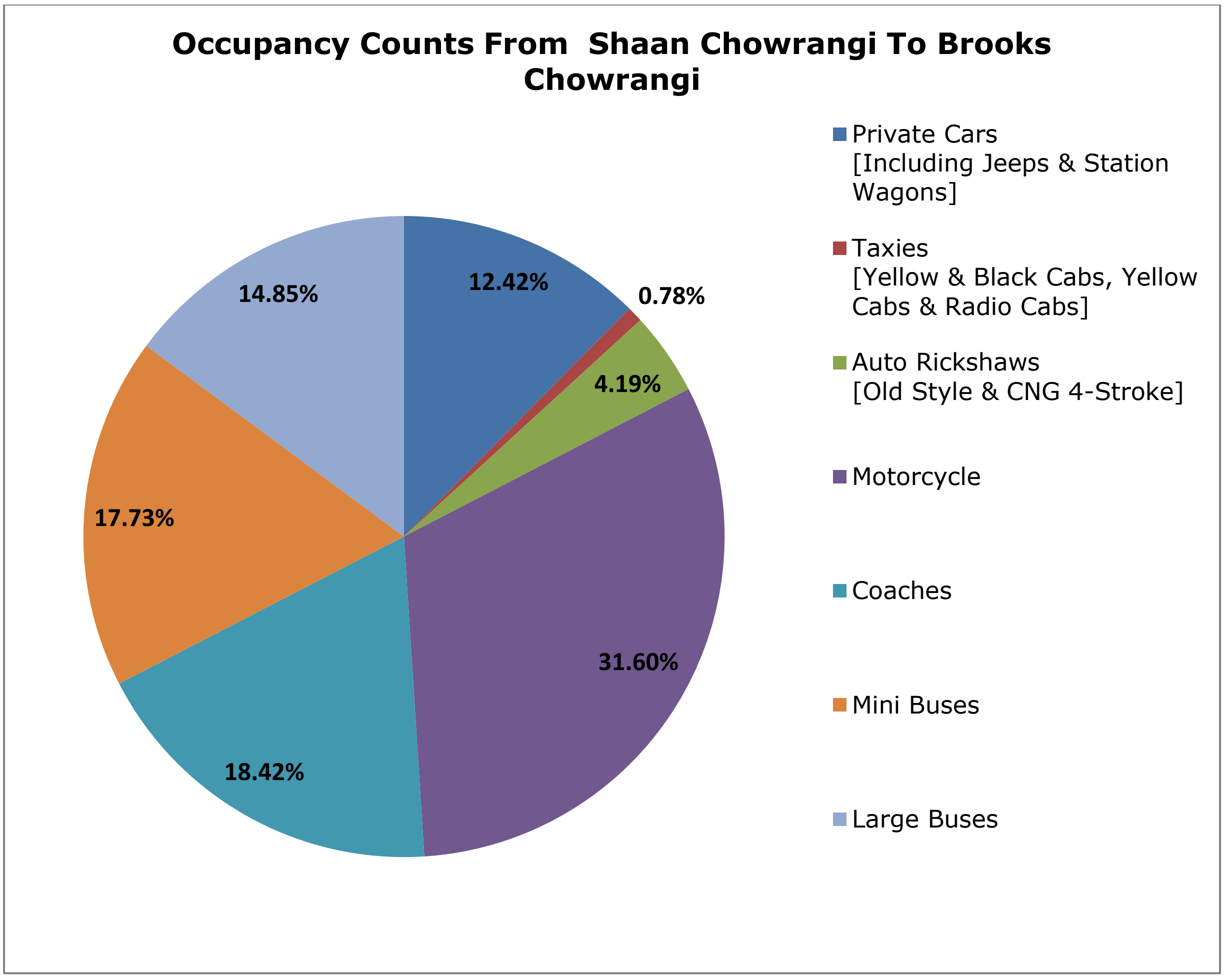


Figure 3.25: Occupancy Counts from Shaan Chowrangi to Brooks Chowrangi (Weekday) - (OC-05)

In Average Weekday, occupancy rate for Public Transport is very high around 51% passengers counts in single direction from Shaan Chowrangi to Brooks Chowrangi. Motorcycles makes 31% share whereas Private Cars Constitutes 12.4% occupancy. Para Transit makes fewer shares around 5%.

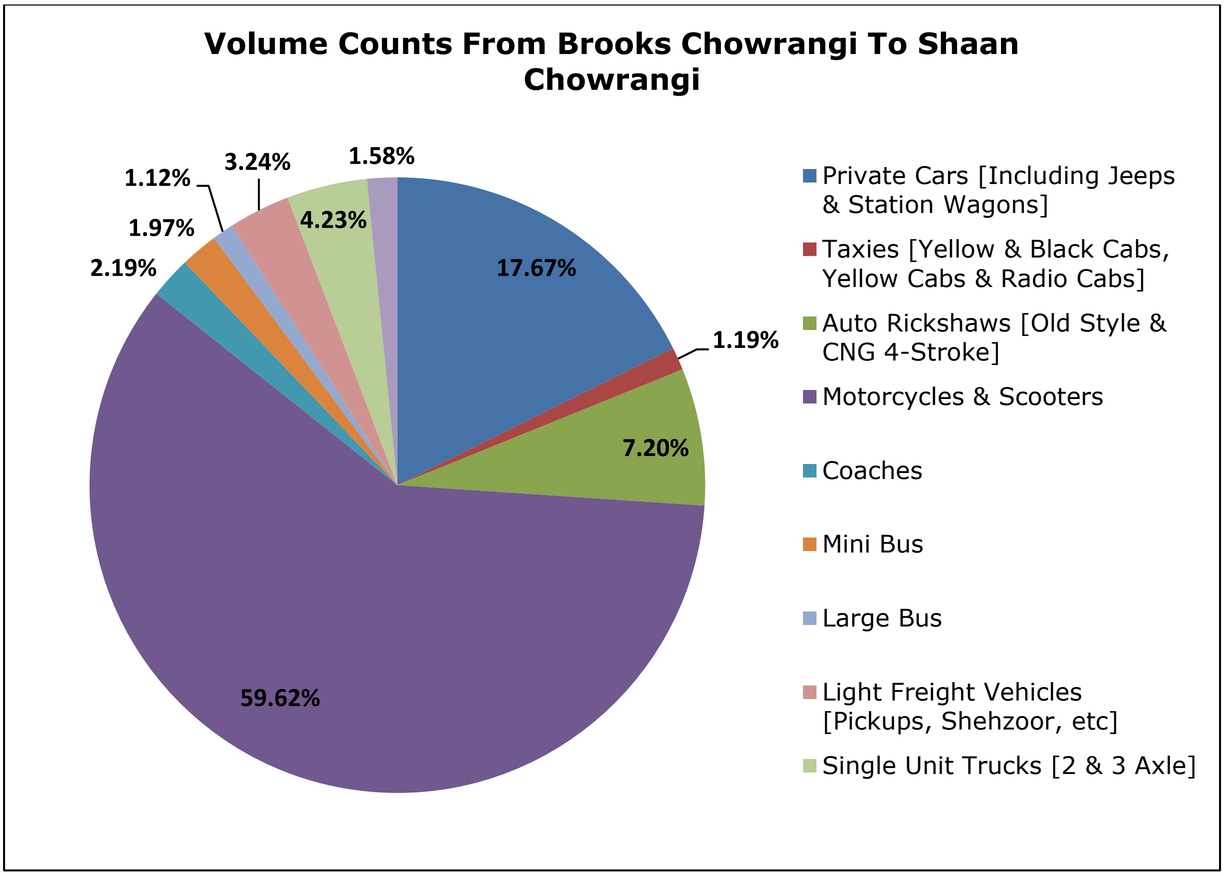


Figure 3.26: Volume Counts from Brooks Chowrangi to Shaan Chowrangi (Weekend) - (VC-05)

On Average Weekend, at this particular location Motorcycles constitutes around 60% whereas Private Cars are almost 17% of the total modal split. Auto Rickshaws has a high modal share at this location which constitutes around 7% as compared to Taxis that are 1%. Public Transport and Freight Vehicles are in very low numbers in this segment and their combined sums up to just 14% of the total vehicular mix.

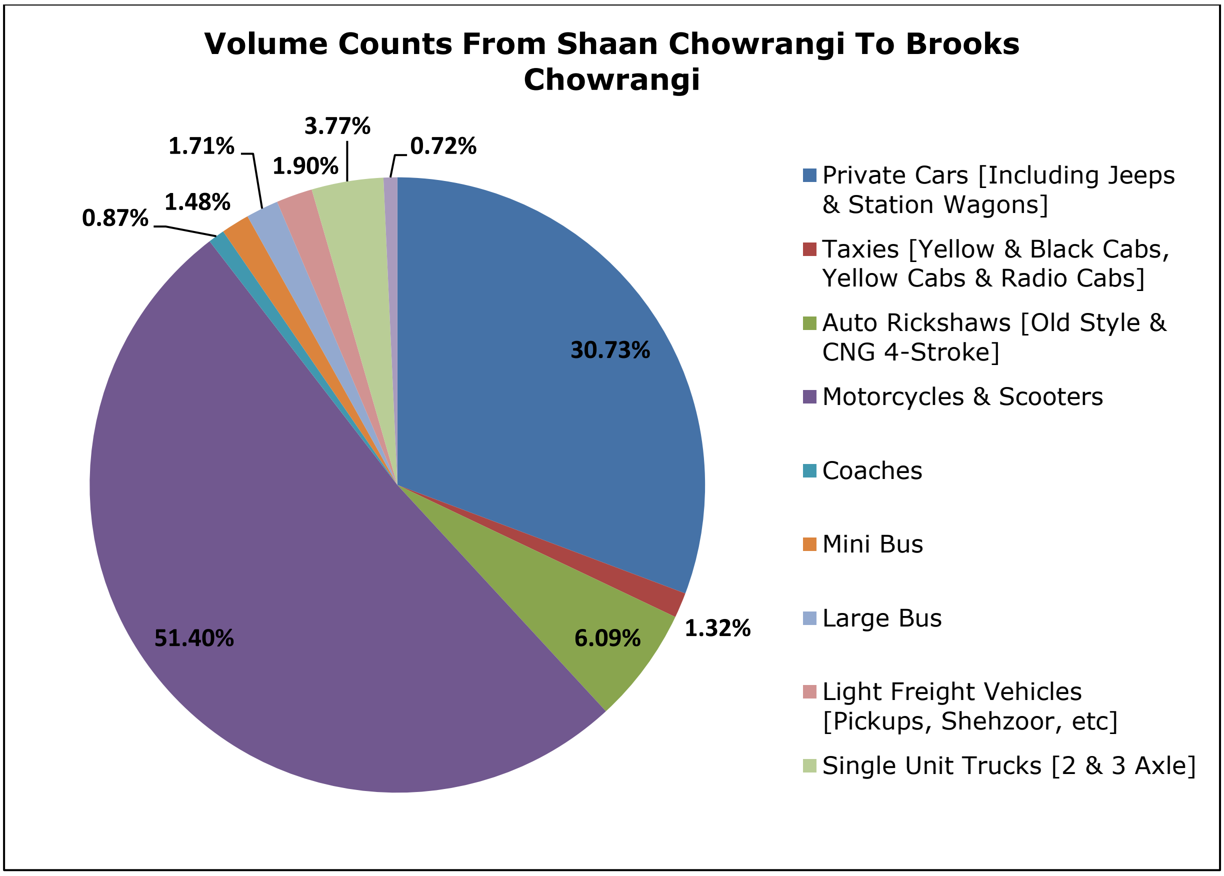


Figure 3.27: Volume Counts from Shaan Chowrangi to Brooks Chowrangi (Weekend) - (VC-05)

On Average Weekend, at this particular location Motorcycles constitutes around 52% whereas Private Cars are almost 30% of the total modal split. Auto Rickshaws has a high modal share at this location which constitutes around 6% as compared to Taxis that are 1%. Public Transport and Freight Vehicles are in very low numbers in this segment and their combined sums up to just 11% of the total vehicular mix.

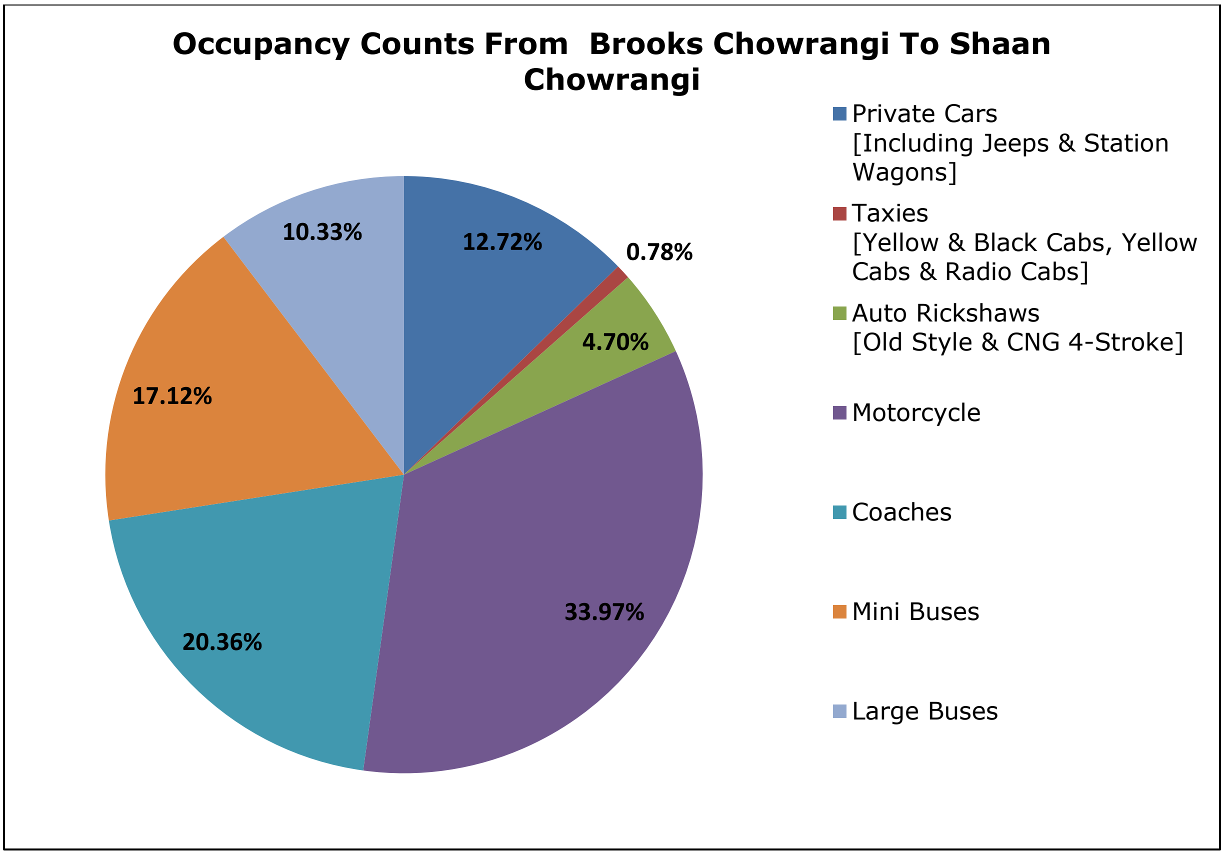


Figure 3.28: Occupancy Counts Brooks Chowrangi to Shaan Chowrangi (Weekend) - (OC-05)

On Average Weekend, occupancy rate for Public Transport is very high around 47.8% passengers counts in single direction from Brooks Chowrangi to Shaan Chowrangi. Motorcycles makes 34% share whereas Private Cars Constitutes 13% occupancy. Para Transit makes fewer shares around 6%.

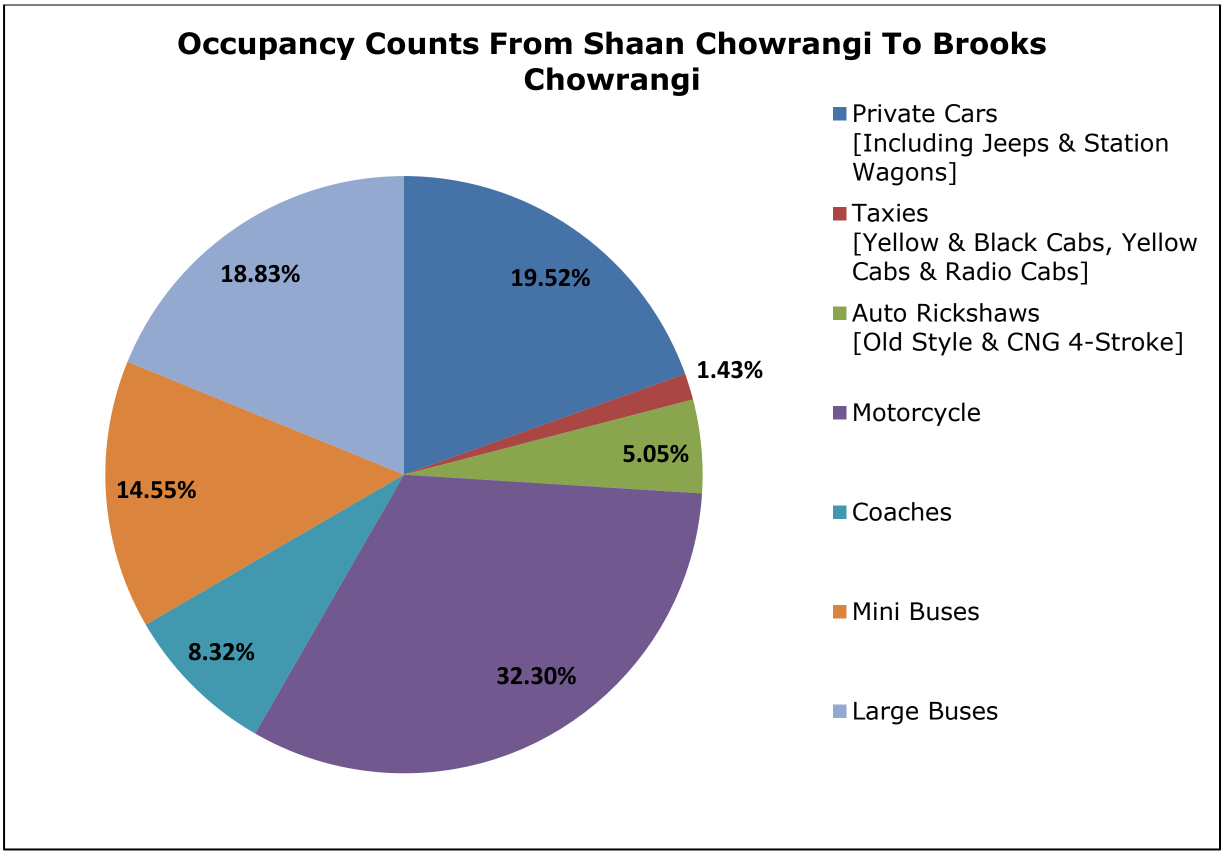


Figure 3.29: Occupancy Counts from Shaan Chowrangi to Brooks Chowrangi (Weekend) - (OC-05)

On Average Weekend, occupancy rate for Public Transport is very high around 41% passengers counts in single direction from Shaan Chowrangi to Brooks Chowrangi. Motorcycles makes 32% share whereas Private Cars Constitutes 19.5% occupancy. Para Transit makes fewer shares around 6%.

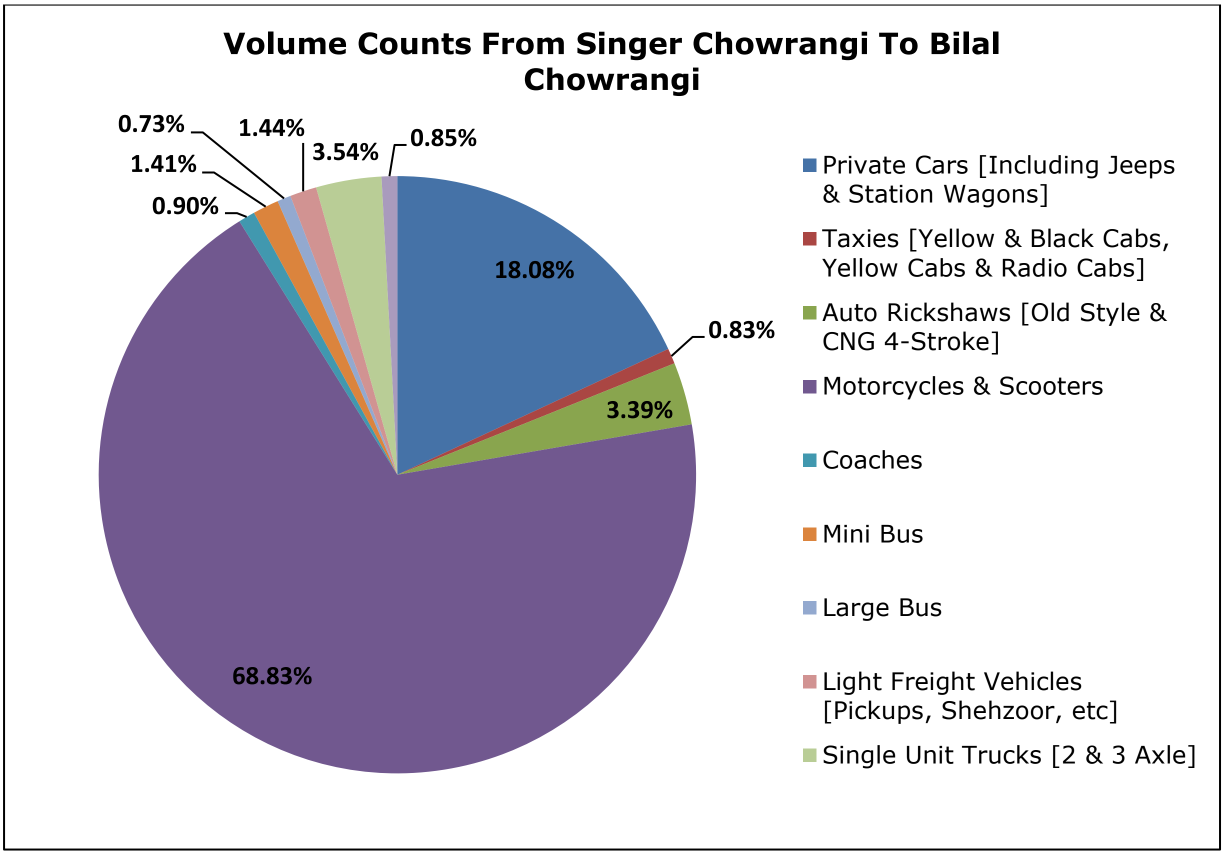


Figure 3.30: Volume Counts from Singer Chowrangi to Bilal Chowrangi (VC-06)

Motorcycles are the most predominant mode of transport in the entire area. Private Cars are the second highest which makes around 18%. Public Transport makes 3% of vehicular mix. Para Transit including Taxi and Rickshaws makes around 5% of the total vehicular share. Freight Traffic constitutes 5% of the total vehicular mix.

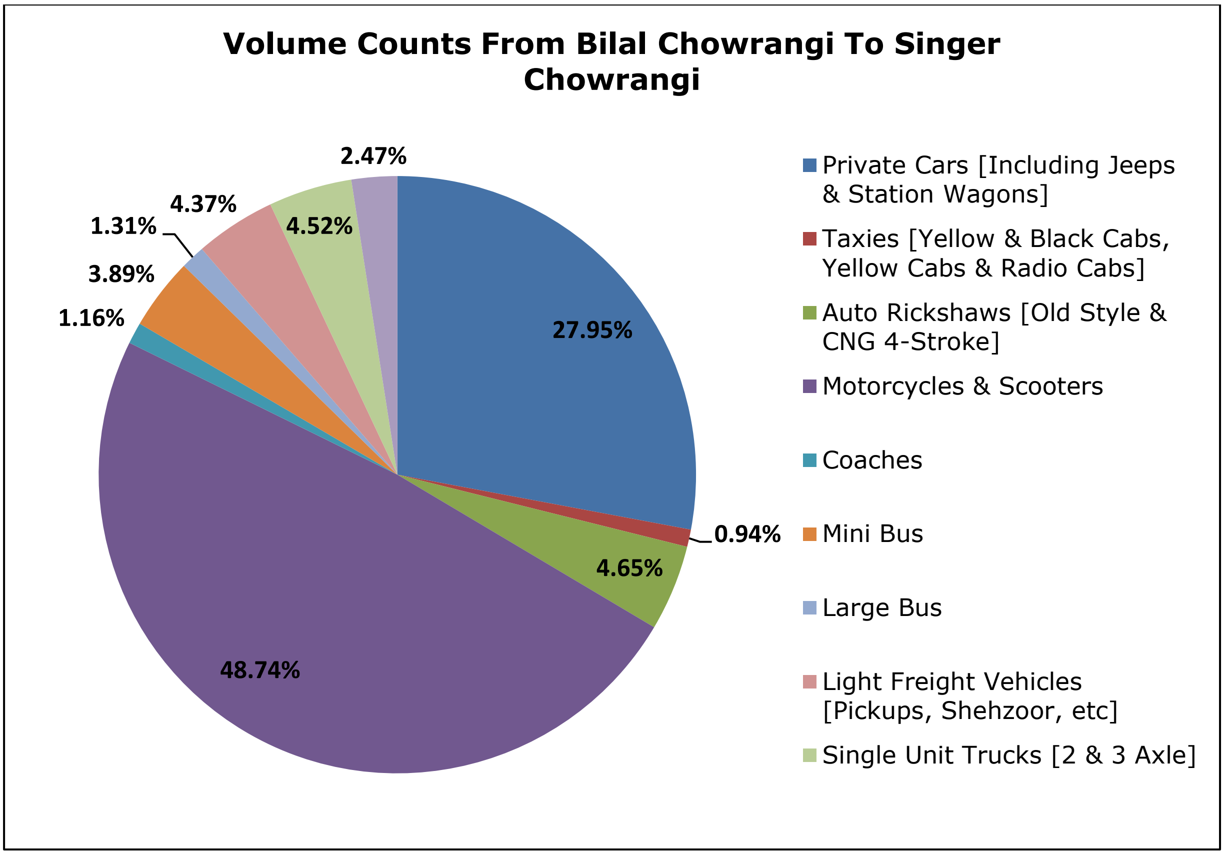


Figure 3.31: Volume Counts from Bilal Chowrangi to Singer Chowrangi (VC-06)

Motorcycles are the most predominant mode of transport in the entire area. Private Cars are the second highest which makes around 28%. Public Transport makes 7% of vehicular mix. Para Transit including Taxi and Rickshaws makes around 6% of the total vehicular share. Freight Traffic constitutes 11% of the total vehicular mix.

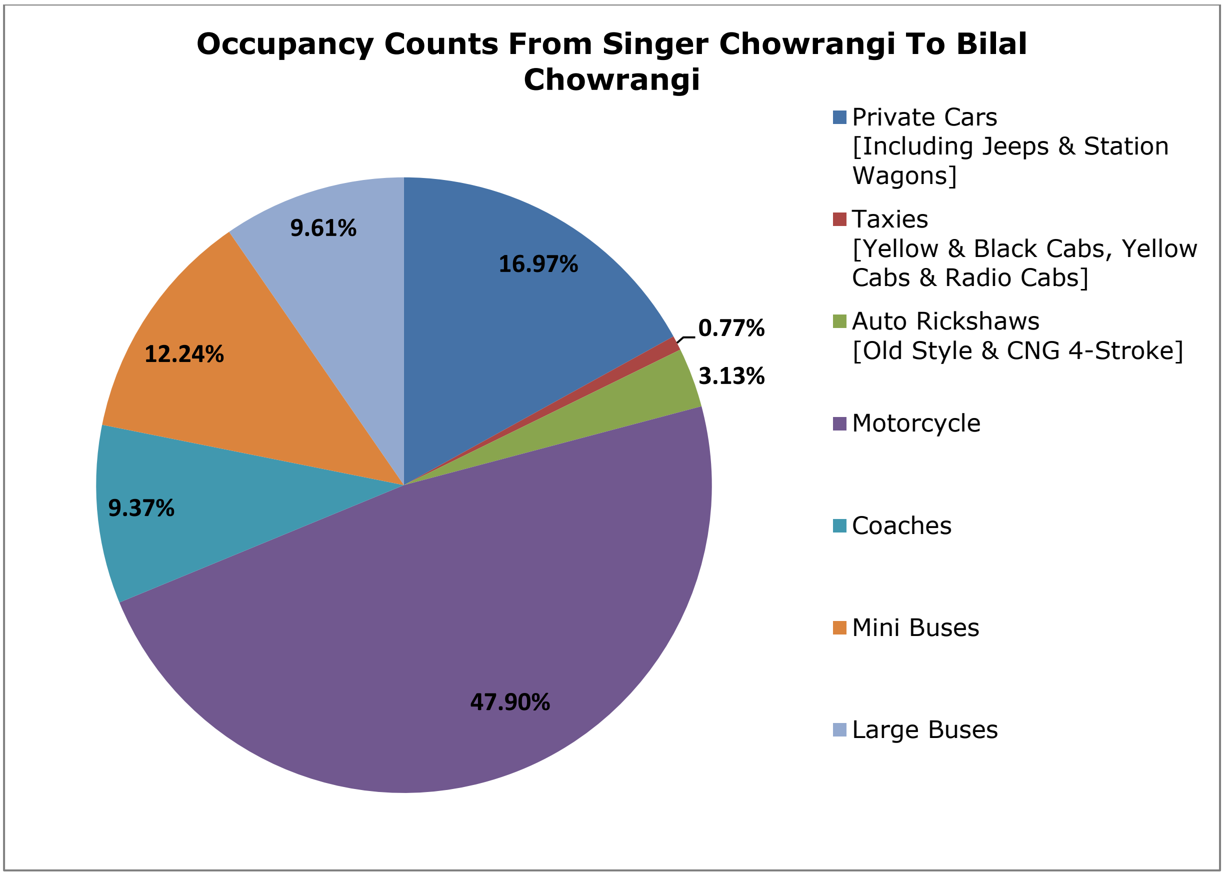


Figure 3.32: Occupancy Counts from Singer Chowrangi to Bilal Chowrangi (OC-06)

In this area occupancy rate for Motorcycle is very high around 48% passengers counts in single direction from Singer Chowrangi to Bilal Chowrangi. Public Transport is the second highest which makes around 32%. Private Cars are 17% occupant. Para Transit has fewer shares that are 4%.

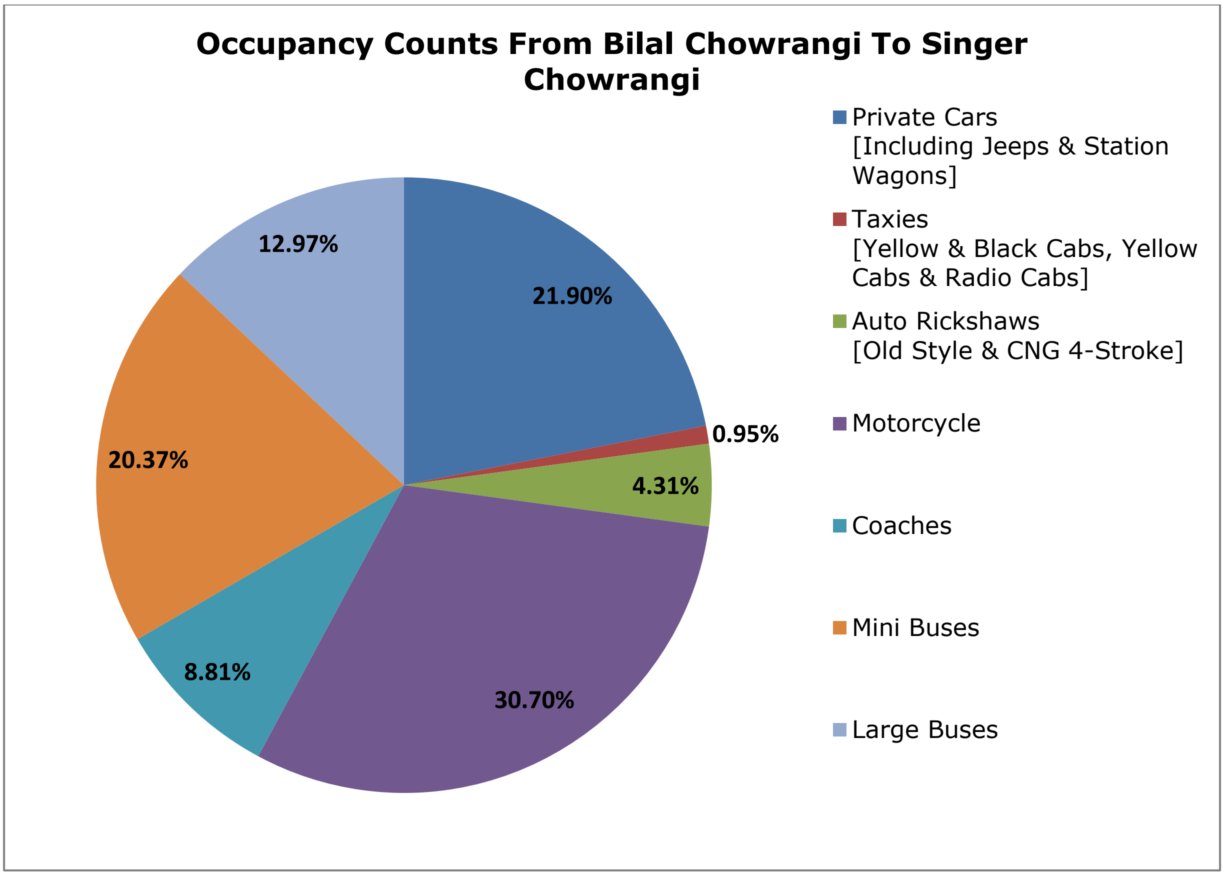


Figure 3.33: Occupancy Counts from Bilal Chowrangi to Singer Chowrangi (OC-06)

In this area occupancy rate for Public Transport is very high around 42% passengers counts in single direction from Bilal Chowrangi to Singer Chowrangi. Motorcycle is the second highest which makes around 31%. Private Cars are 22% occupant. Para Transit has fewer shares that are 5%.

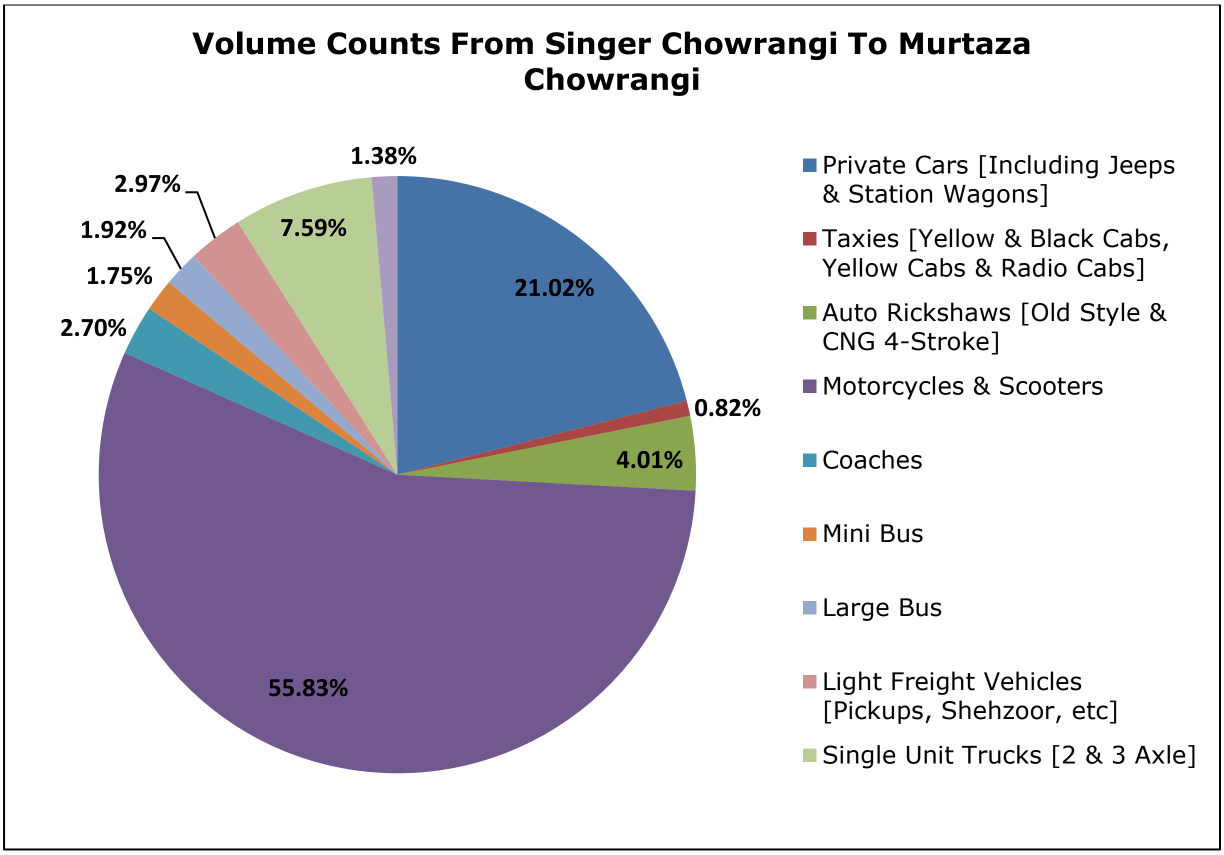


Figure 3.34: Volume Counts from Singer Chowrangi to Murtaza Chowrangi (VC-07)

In this segment of Singer Chowrangi to Murtaza Chowrangi, Motor Cycles constitutes almost half of the modal split i.e 56%. Among rest of the traffic private cars are predominant having 21% modal share whereas rickshaws and taxis constitutes almost 5%, Public Transport constitutes almost 7% and freight vehicles are 11%.

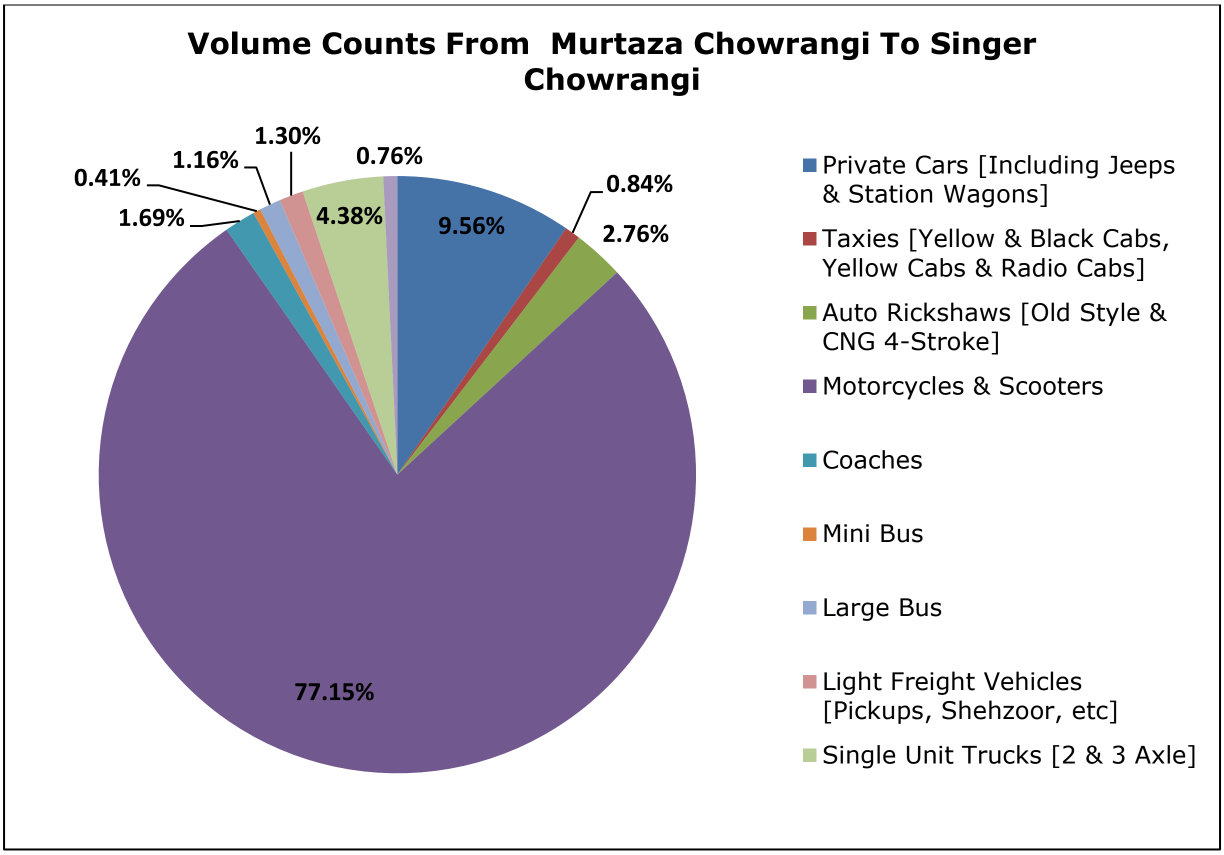


Figure 3.35: Volume Counts from Murtaza Chowrangi to Singer Chowrangi (VC-07)

In this segment of Murtaza Chowrangi to Singer Chowrangi, Motor Cycles constitutes almost half of the modal split i.e 77%. Among rest of the traffic private cars are predominant having 9% modal share whereas rickshaws and taxis constitutes almost 4%, Public Transport constitutes almost 3% and freight vehicles are 6%.

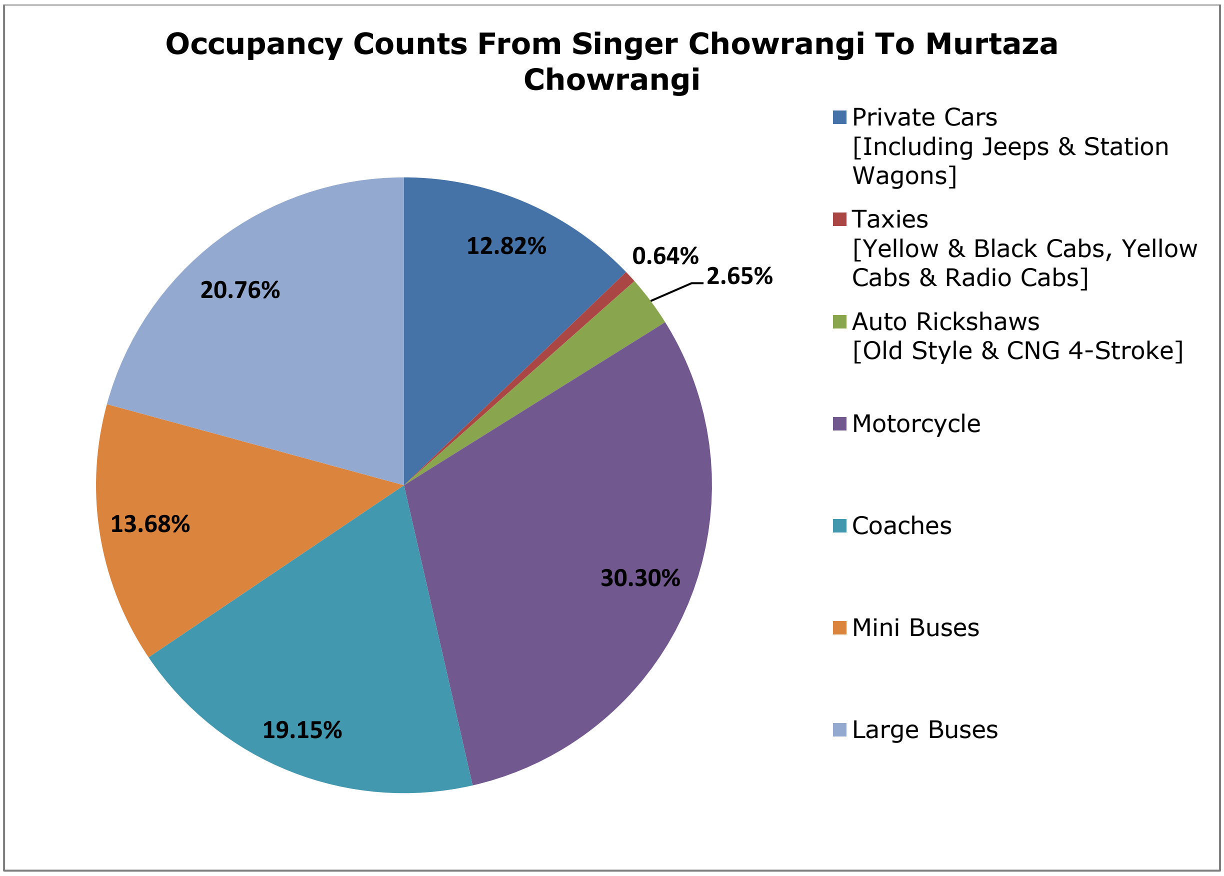


Figure 3.36: Occupancy Counts from Singer Chowrangi to Murtaza Chowrangi (OC-07)

In this area occupancy rate for Public Transport is very high around 54% passengers counts in single direction from Singer Chowrangi to Murtaza Chowrangi. Motorcycles are the second highest which makes around 30%. Private cars are 12% occupant. Taxies and Rickshaw have fewer shares that is 2.65% and 0.64% respectively.

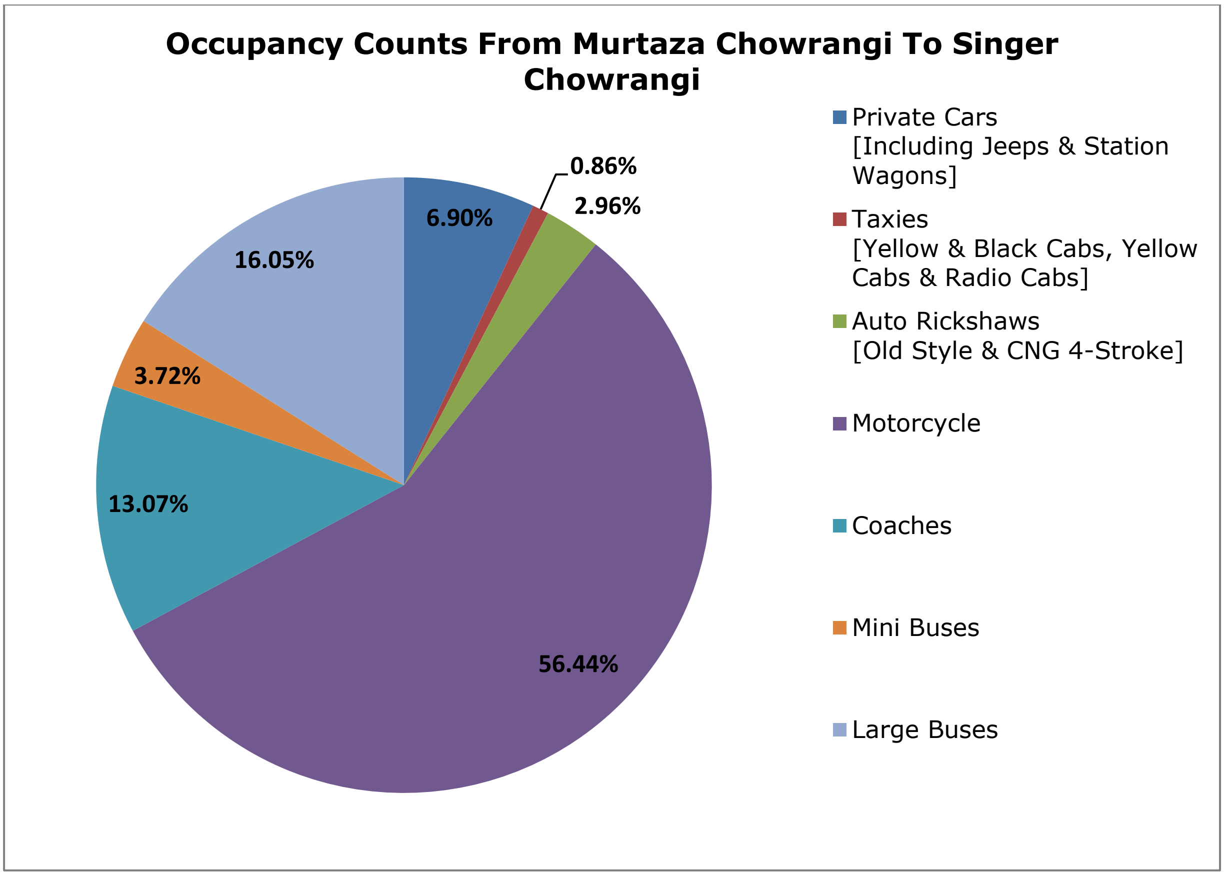


Figure 3.37: Occupancy Counts from Murtaza Chowrangi to Singer Chowrangi (OC-07)

In this area occupancy rate for Motorcycle is very high around 57% passengers counts in single direction from Murtaza Chowrangi to Singer Chowrangi. Public Transport is the second highest which makes around 33%. Private Cars are 7% occupant. Para Transit is less share 4%.

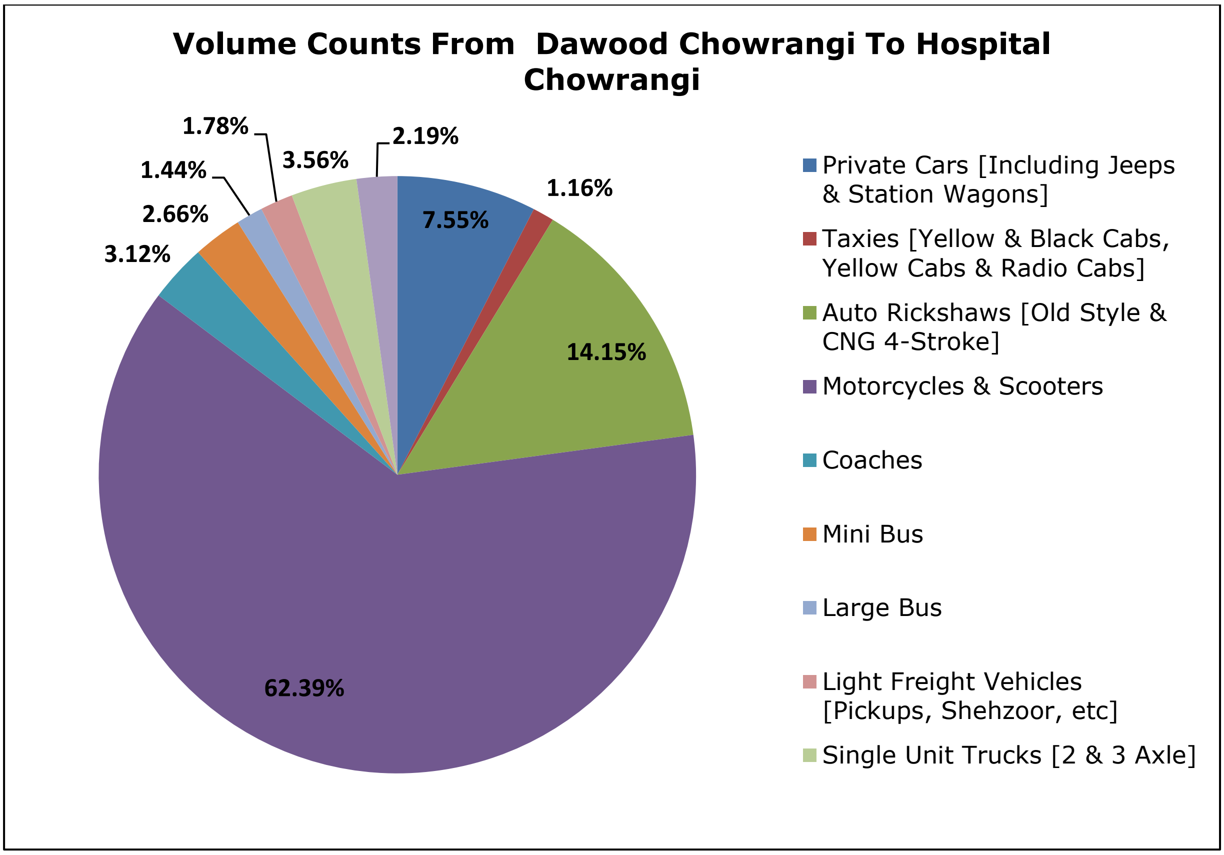


Figure 3.38: Volume Counts from Dawood Chowrangi to Hospital Chowrangi (VC-08)

Motorcycles are in high number at this location which constitutes around 63% of vehicular mix. Out of other modal classifications, Para Transit has high modal share i.e 16%. Private Cars have 8% share, Public and freight Transport have share in terms of modal split that is 7.22% and 7.53% respectively.

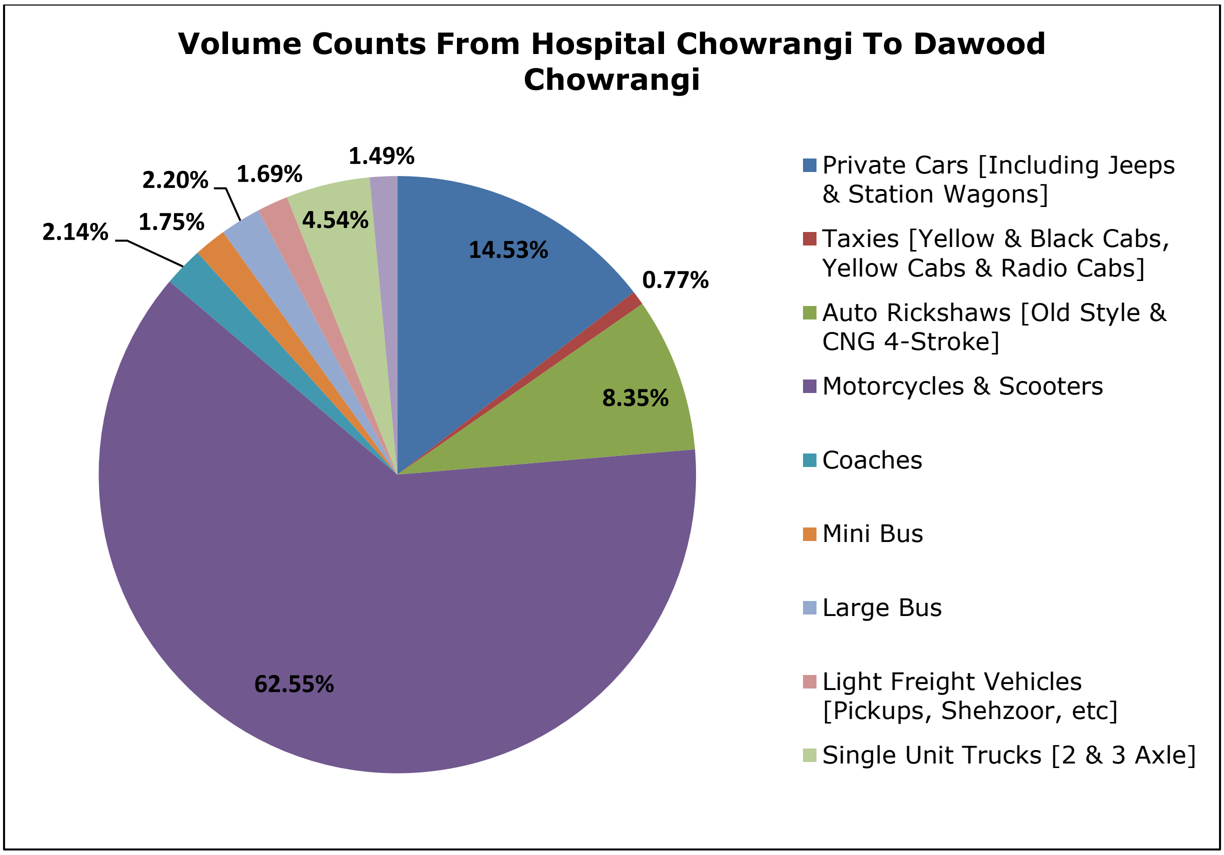


Figure 3.39: Volume Counts from Hospital Chowrangi to Dawood Chowrangi (VC-08)

Motorcycles are in high number at this location which constitutes around 62.55% of vehicular mix. Out of other modal classifications, Private Cars have 14% share, Public and freight Transport have share in terms of modal split that is 6% and 7.72% respectively. Para Transit has 9% modal share.

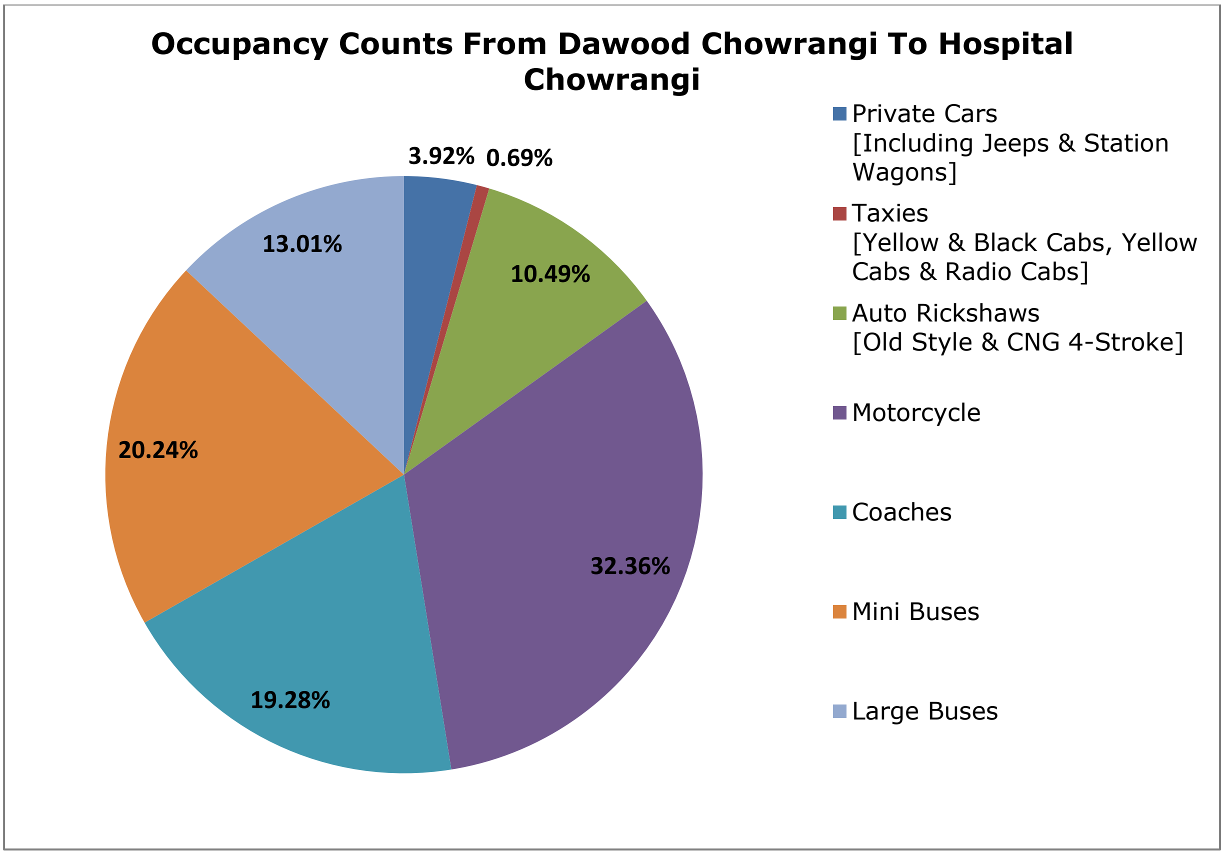


Figure 3.40: Occupancy Counts from Dawood Chowrangi to Hospital Chowrangi (OC-08)

In this area occupancy rate for Public Transport is very high around 52% passengers counts in single direction from Dawood Chowrangi to Hospital Chowrangi. Motorcycles are the second highest which makes around 32%. Para Transit is 12% occupant also Private cars are 5%.

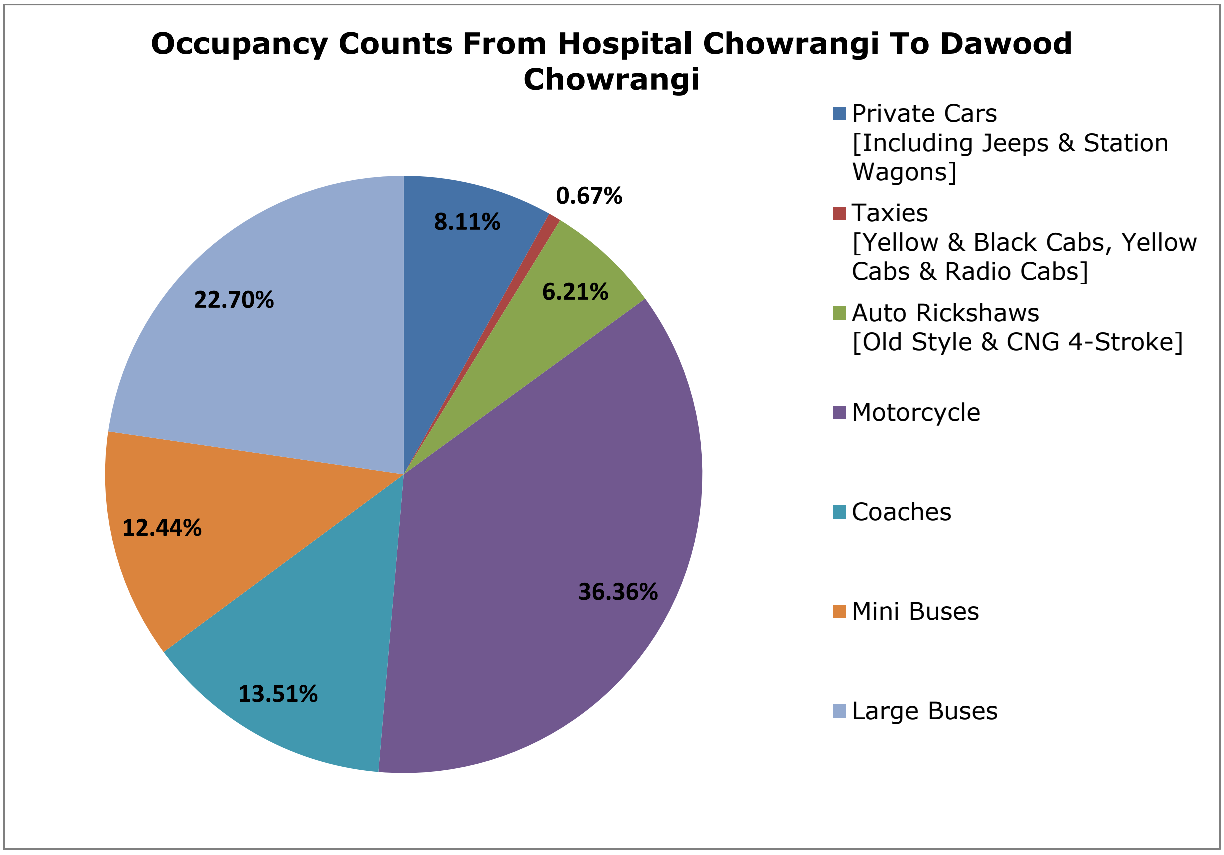


Figure 3.41: Occupancy Counts from Hospital Chowrangi to Dawood Chowrangi (OC-08)

In this area occupancy rate for Public Transport is very high around 49% passengers counts in single direction from Hospital Chowrangi to Dawood Chowrangi. Motorcycles are the second highest which makes around 36%. Private cars are 8% and Para transit are 7% occupant.

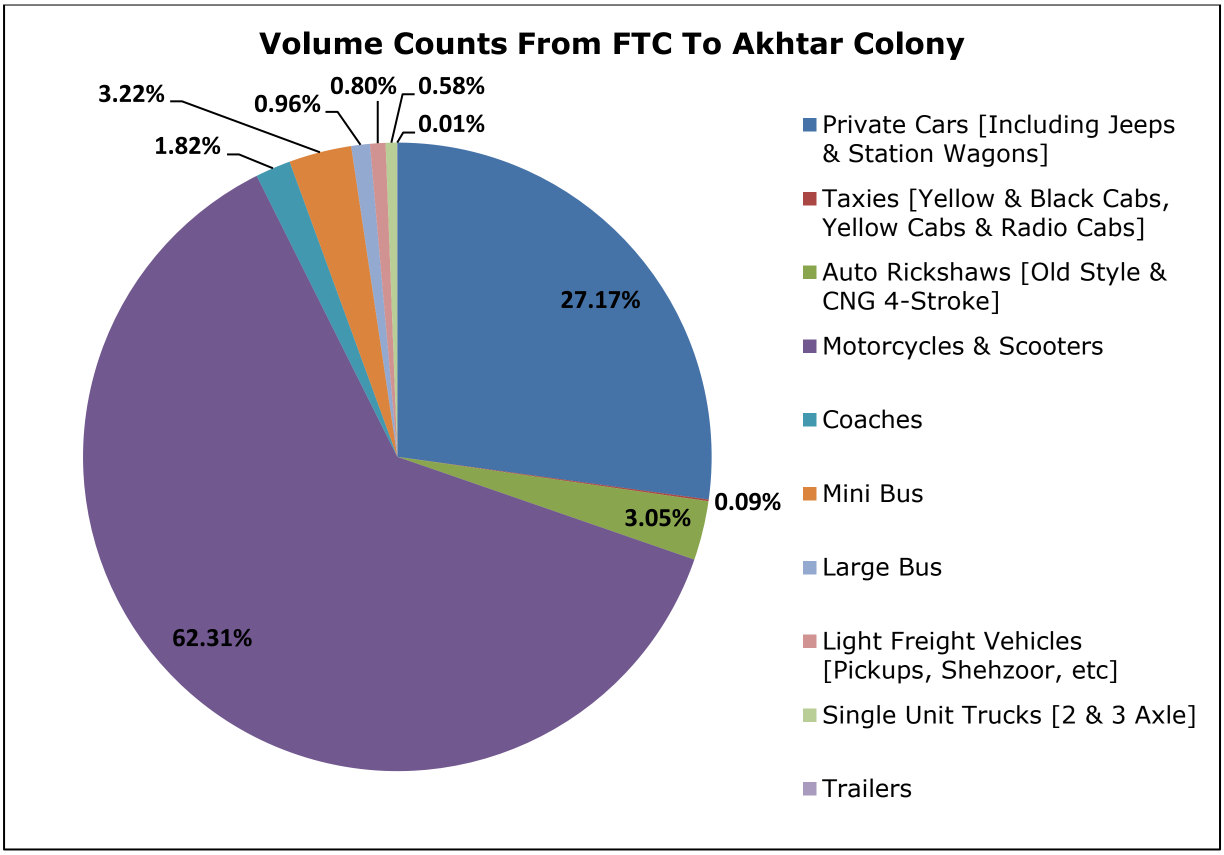


Figure 3.42: **Volume Counts from FTC to Akhtar Colony (VC-09)**

Motorcycles are the most predominant mode of transport in the entire area. Private Cars are the second highest which makes around 27%. Public Transport makes 6% of vehicular mix. Para Transit including Taxi and Rickshaws makes around 3.14% of the total vehicular share. Freight Traffic constitutes 1.39% of the total vehicular mix.

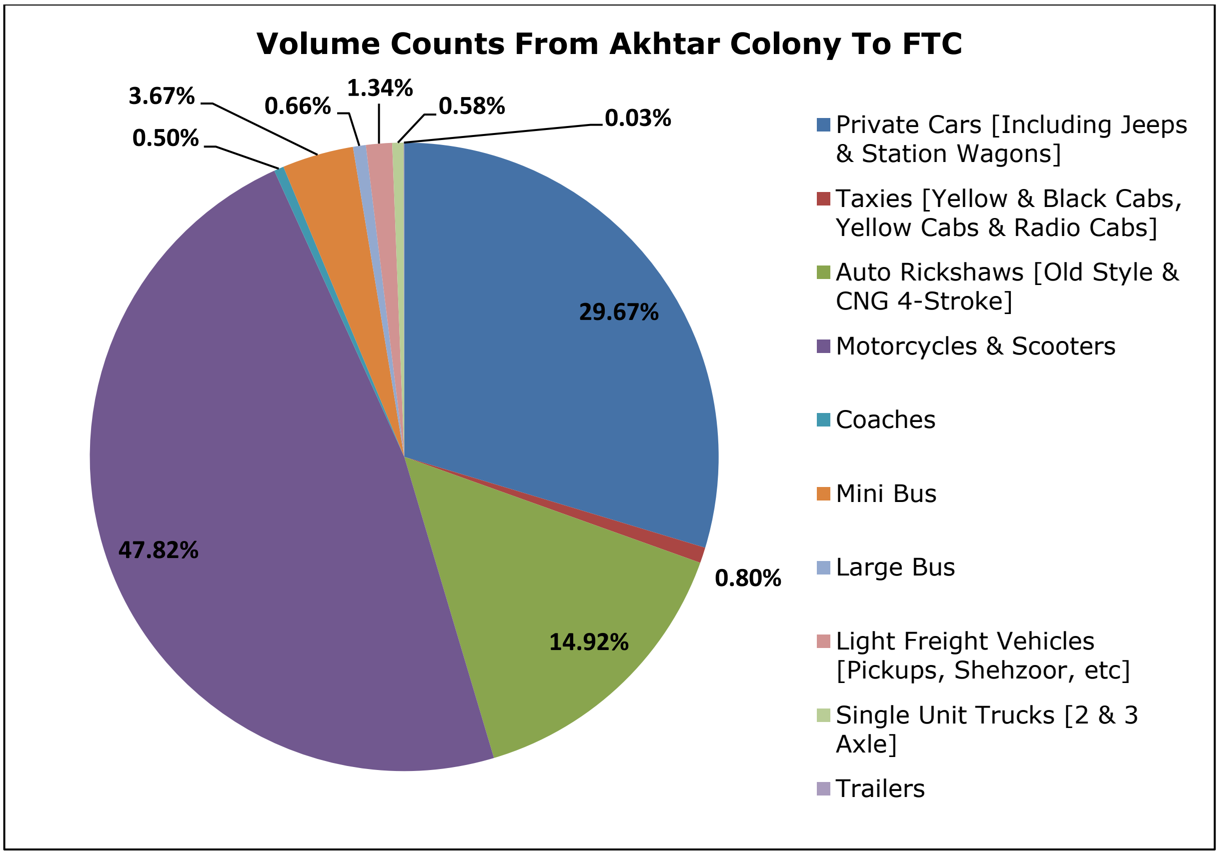


Figure 3.43: **Volume Counts from Akhtar Colony to FTC (VC-09)**

Motorcycles are the most predominant mode of transport in the entire area. Private Cars are the second highest which makes around 30%. Public Transport makes 6% of vehicular mix. Para Transit including Taxi and Rickshaws makes around 16% of the total vehicular share. Freight Traffic constitutes 1.59% of the total vehicular mix.

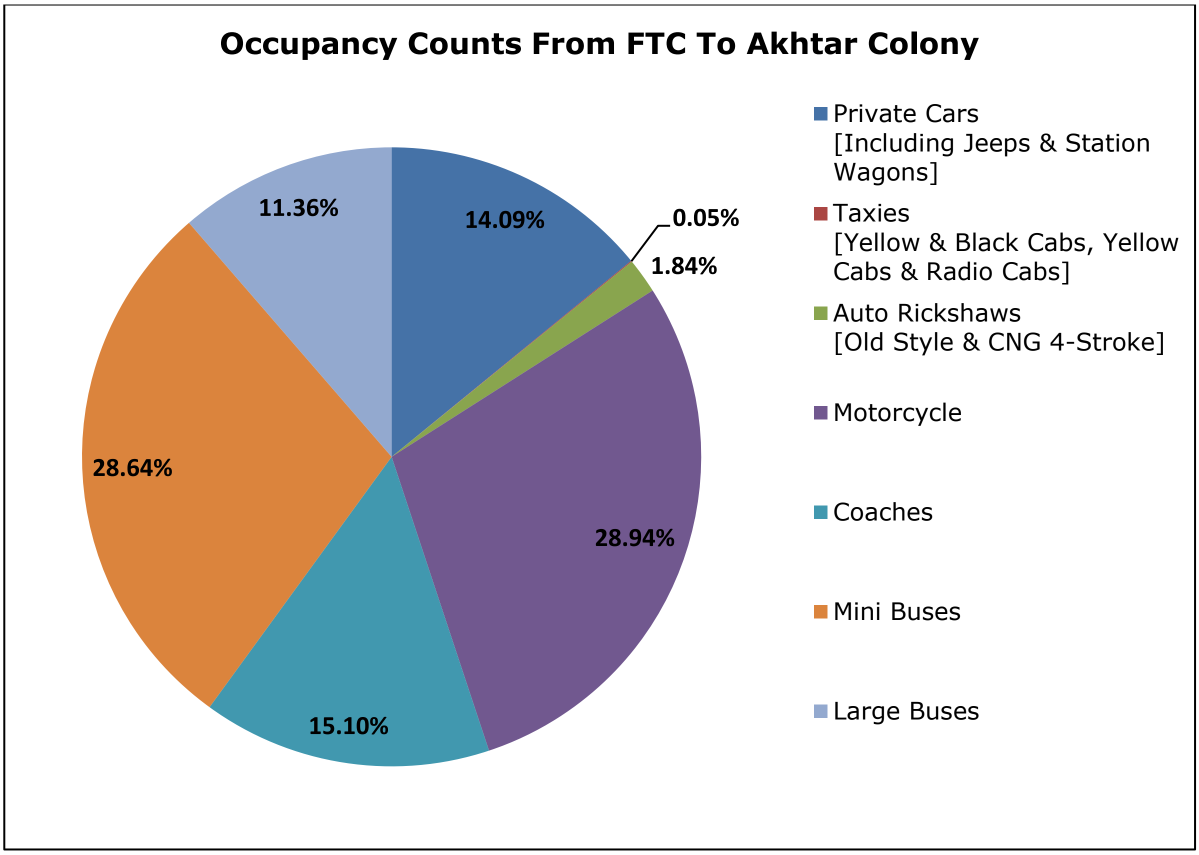


Figure 3.44: Occupancy Counts from FTC to Akhtar Colony (OC-09)

In this area occupancy rate for Public Transport is very high around 55% passengers counts in single direction from FTC to Akhtar Colony. Motorcycles are the second highest which makes around 28.9%. Private cars are 14.09% and Para transit are 2% occupant.

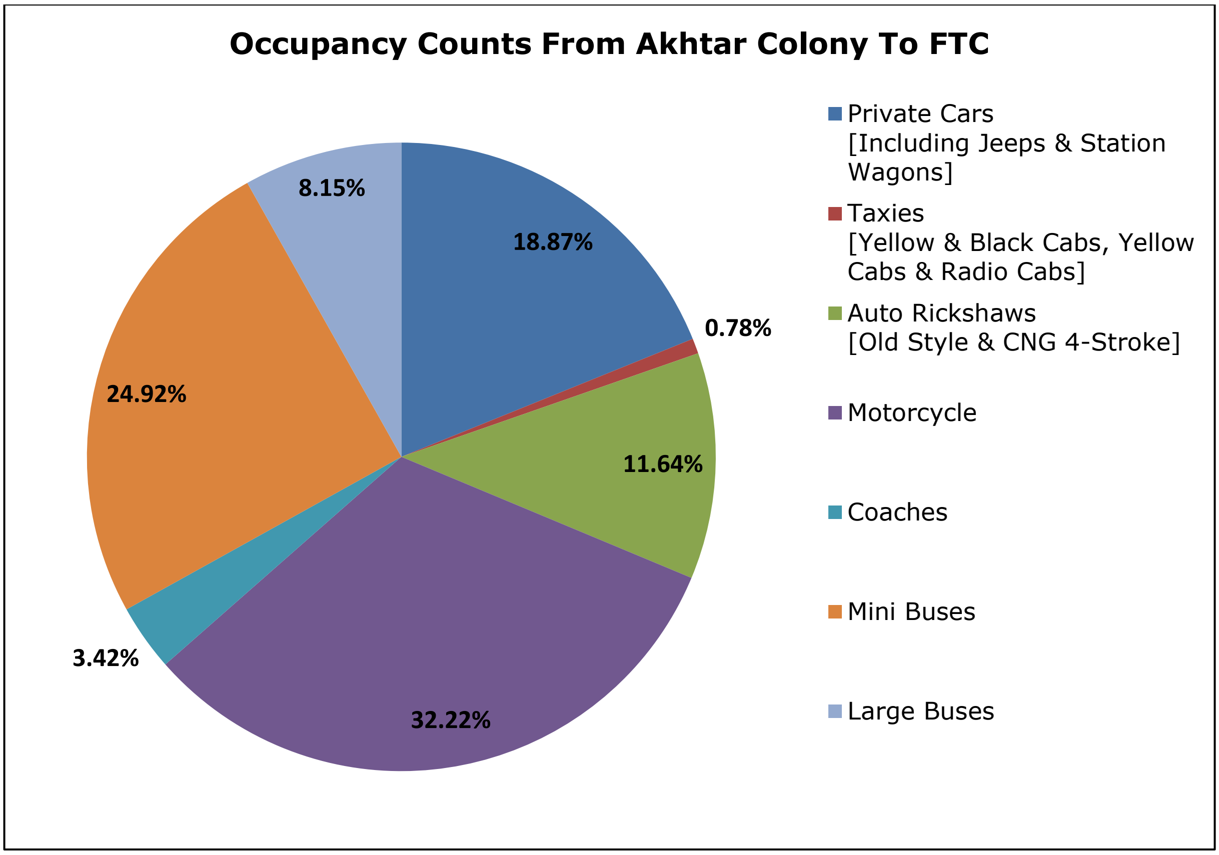


Figure 3.45: Occupancy Counts from Akhtar Colony to FTC (OC-09)

In this area occupancy rate for Public Transport is very high around 36% passengers counts in single direction from Akhtar Colony to FTC. Motorcycles are the second highest which makes around 32.22%. Private cars are 18.87% and Para transit are 12.42% occupant.

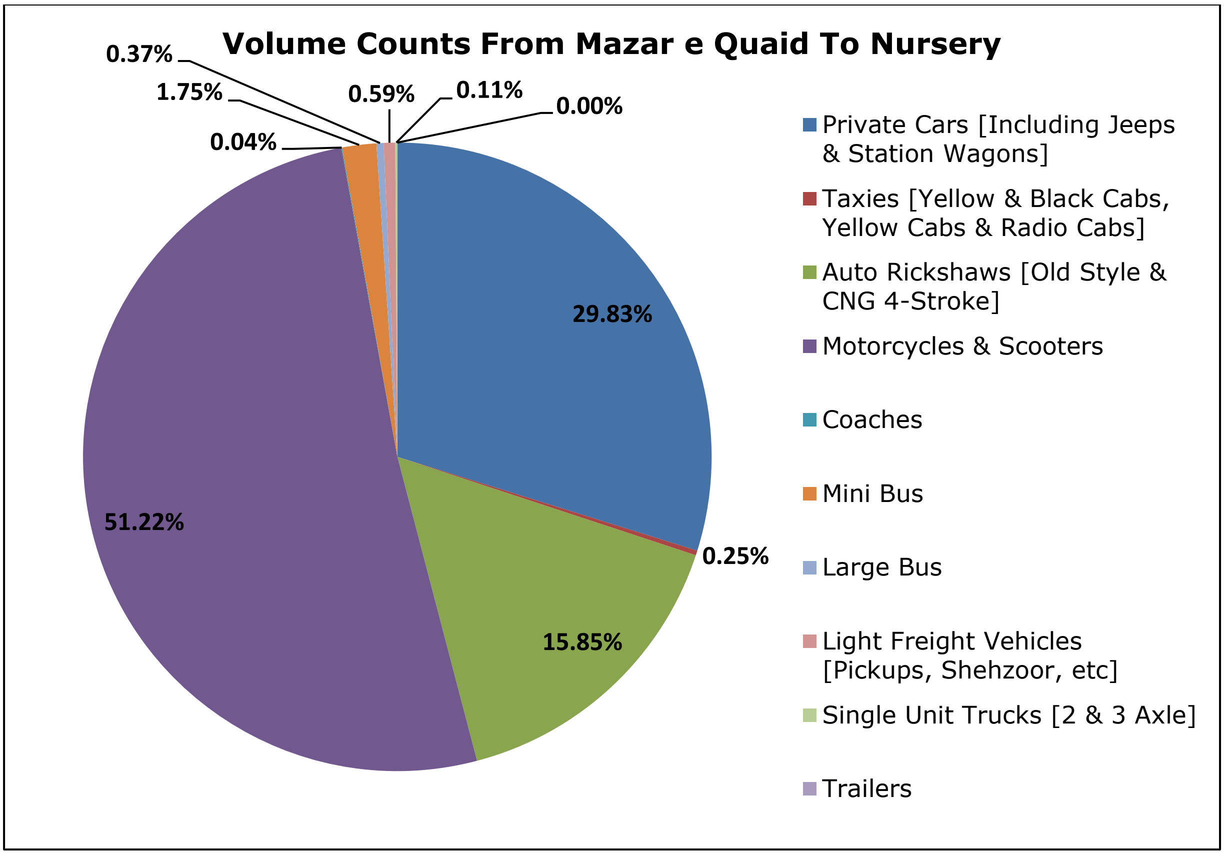


Figure 3.46: Volume Counts from Mazar e Quaid to Nursery (VC-11)

At this particular location Motorcycles constitutes around 51.2% whereas Private Cars are almost 29.8% of the total modal split. Para transit includes Auto Rickshaws and Taxies have high modal share at this location which constitutes around 17%. Public Transport and Light Freight Vehicles are in very low numbers in this segment of Tariq Road to Nursery which combined sums up to just 1% of the total vehicular mix.

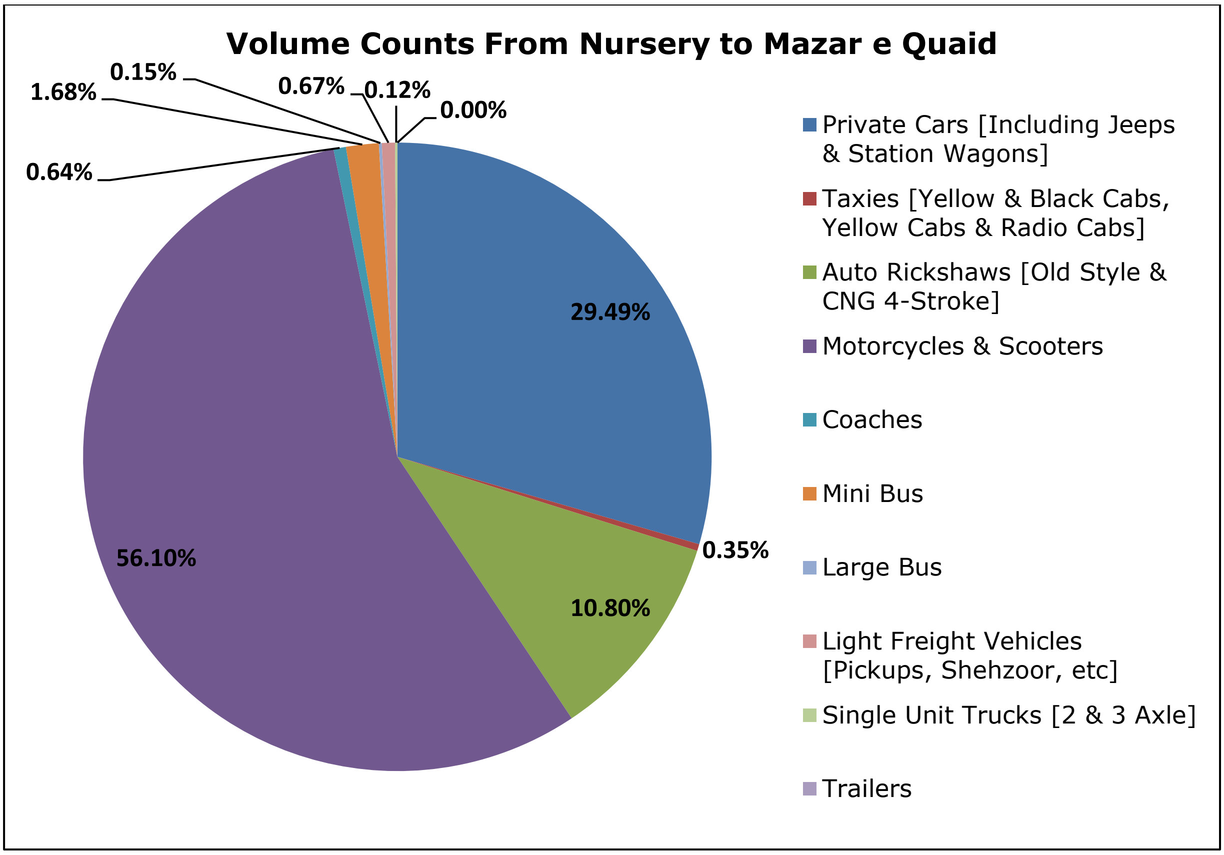


Figure 3.47: Volume Counts from Nursery to Mazar e Quaid (VC-11)

At this particular location Motorcycles constitutes around 56% whereas Private Cars are almost 29.4% of the total modal split. Para transit includes Auto Rickshaws and Taxies have high modal share at this location which constitutes around 11%. Public Transport and Light Freight Vehicles are in very low numbers in this segment of Tariq Road to Nursery which combined sums up to just 3% of the total vehicular mix.

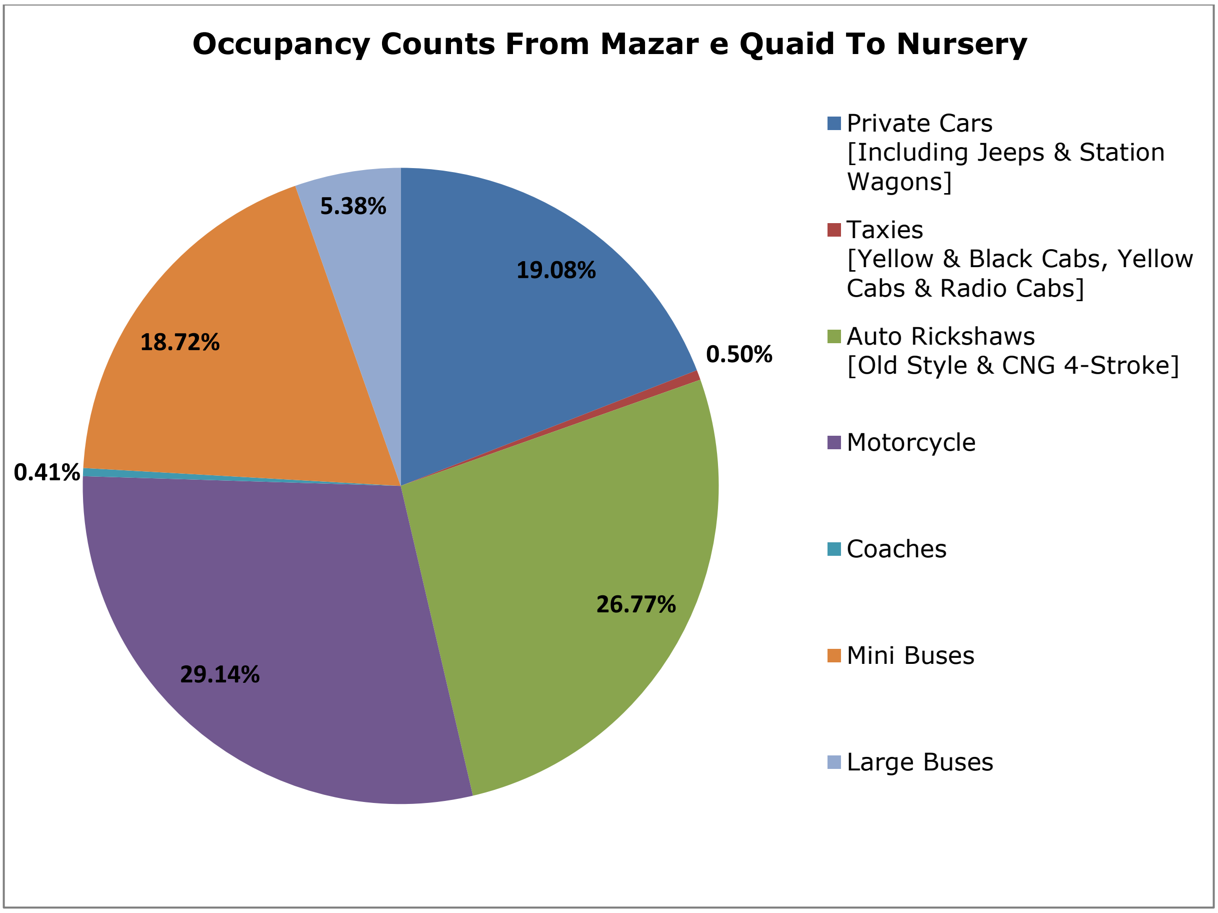


Figure 3.48: Occupancy Counts from Mazar e Quaid to Nursery (OC-11)

In this area occupancy rate for Motorcycles is very high around 29% passengers counts in single direction from Mazar-e-Quaid to Nursery. Para transit is the second highest which makes around 26.7%. Public Transport is 24.49% and Private cars are 19% occupant.

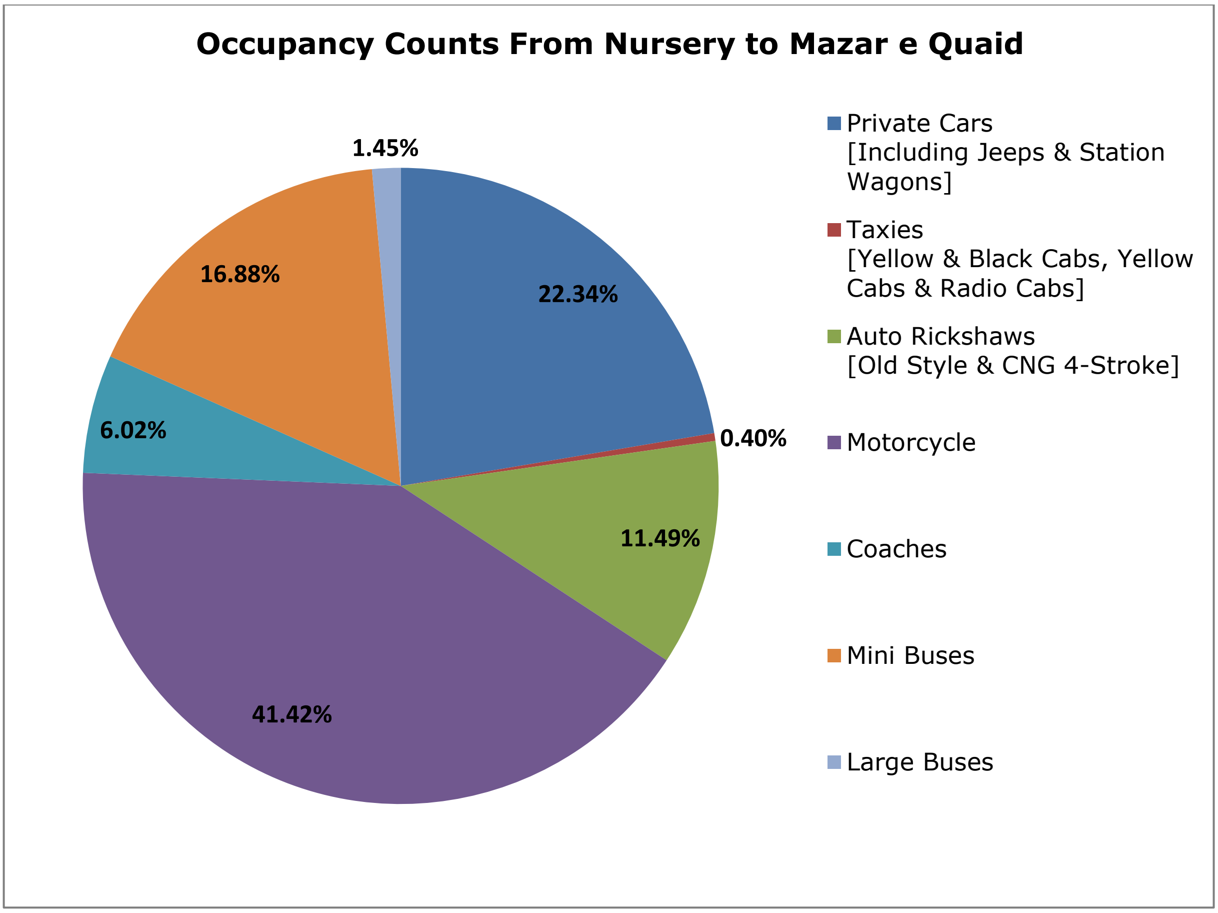


Figure 3.49: Occupancy Counts from Nursery to Mazar e Quaid (OC-11)

In this area occupancy rate for Motorcycles is very high around 41.42% passengers counts in single direction from Mazar-e-Quaid to Nursery. Public Transport is the second highest which makes around 24.45%. Private cars are 22.34% and Para transit is 12% occupant.

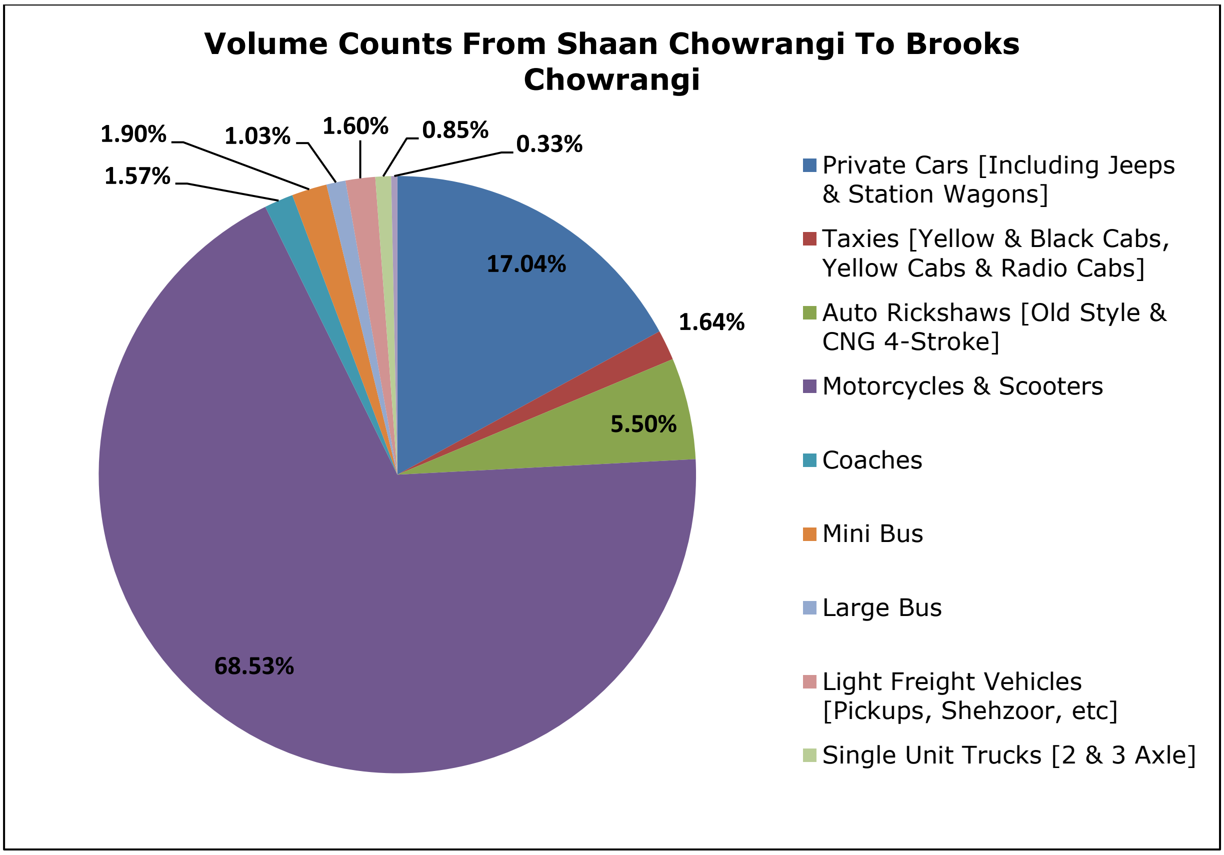


Figure 3.50: Volume Counts from Shaan Chowrangi to Brooks Chowrangi (VC-12)

Motor cycles constitutes the highest percentage of modal share which is 69% of the total and if cars be included which is 17% it makes more than three quarter of the total modal split which clearly suggests that the private vehicle dependency is very high. Auto Rickshaw constitutes around 6% of the vehicular mix and taxies are very low in numbers that is 2% and all Public Transport adding up will only be 5%, similarly Freight Transport have 3% share at this particular location.

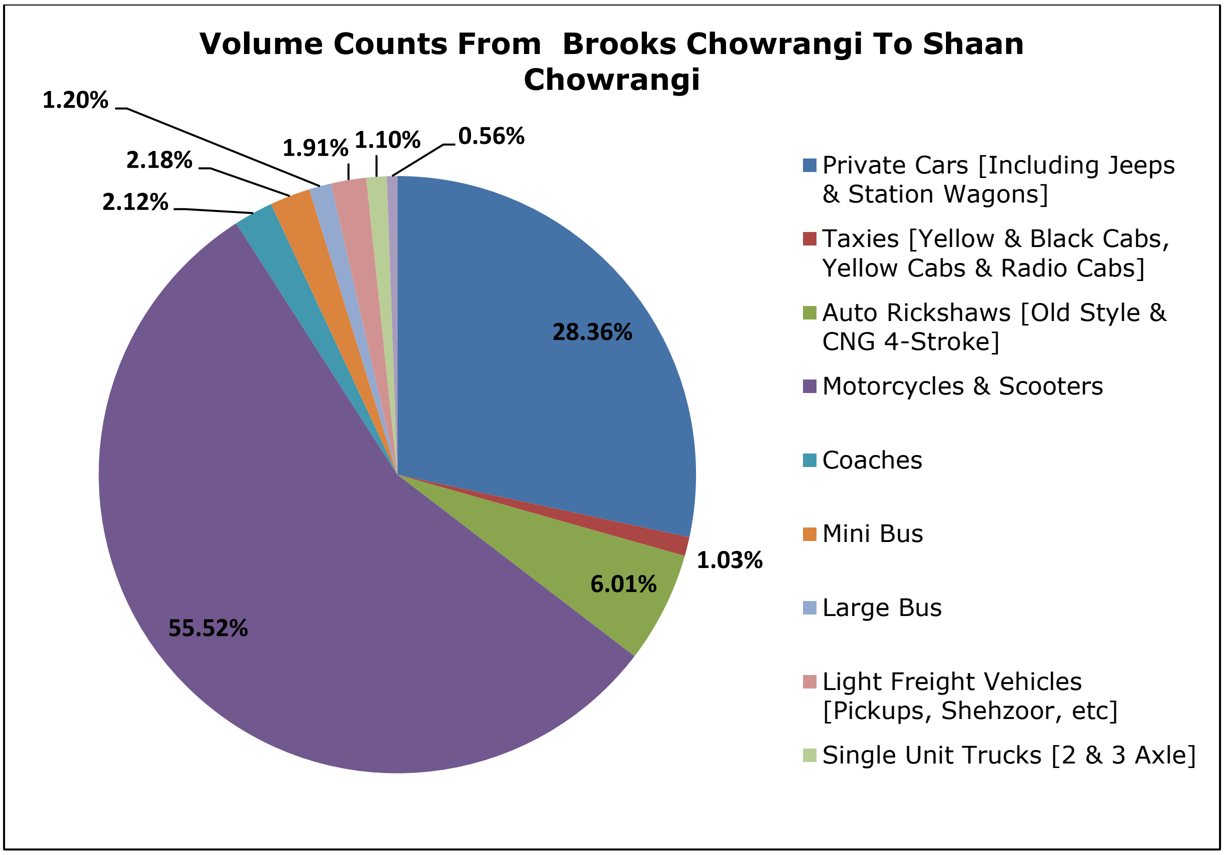


Figure 3.51: Volume Counts from Brooks Chowrangi to Shaan Chowrangi (VC-12)

Motor cycles constitutes the highest percentage of modal share which is 56% of the total and if cars be included which is 29% it makes more than three quarter of the total modal split which clearly suggests that the private vehicle dependency is very high. Auto Rickshaw constitutes around 6% of the vehicular mix and taxies are very low in numbers that is 1% and all Public Transport adding up will only be 6%, similarly Freight Transport have less than 4% share at this particular location.

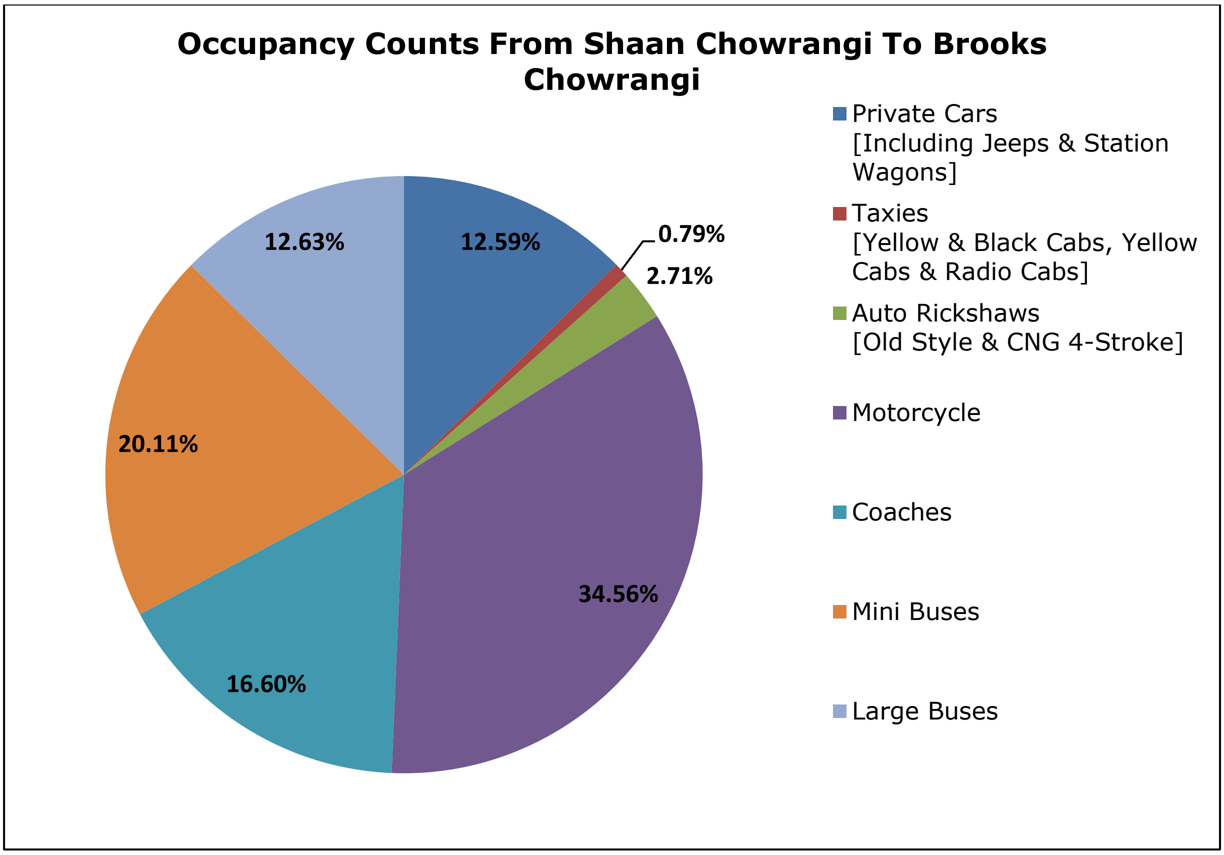


Figure 3.52: Occupancy Count from Shaan Chowrangi to Brooks Chowrangi (OC-12)

In this area occupancy rate for Public Transport is very high around 49% passengers counts in single direction from Shaan Chowrangi to Brooks Chowrangi. Motorcycles are the second highest which makes 35%. Private Cars are 12.59% occupant. Para Transit makes fewer shares around 4%.

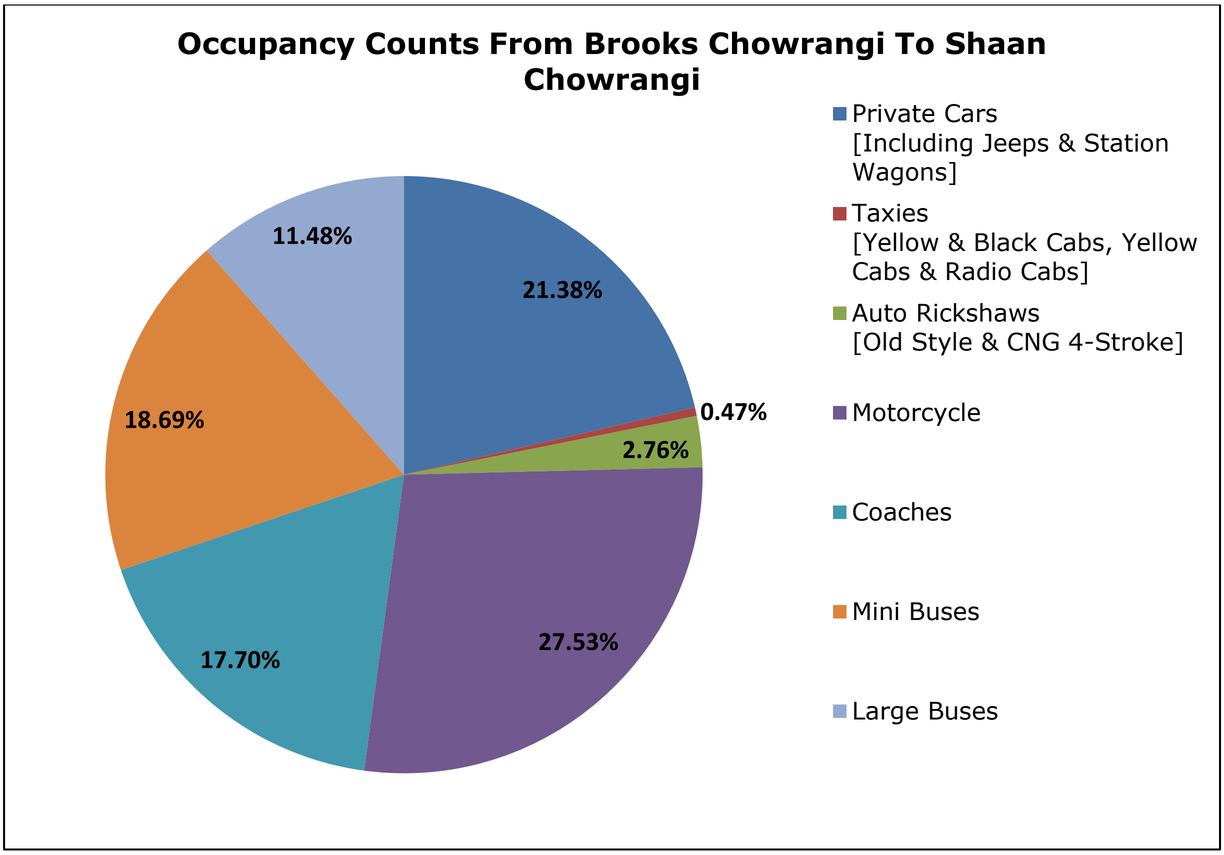


Figure 3.53: Occupancy Count from Brooks Chowrangi to Shaan Chowrangi (OC-12)

In this area occupancy rate for Public Transport is very high around 48% passengers counts in single direction from Brooks Chowrangi to Shaan Chowrangi. Motorcycles are the second highest which makes 28%. Private Cars are 22% occupant. Para Transit makes fewer shares around 4%.

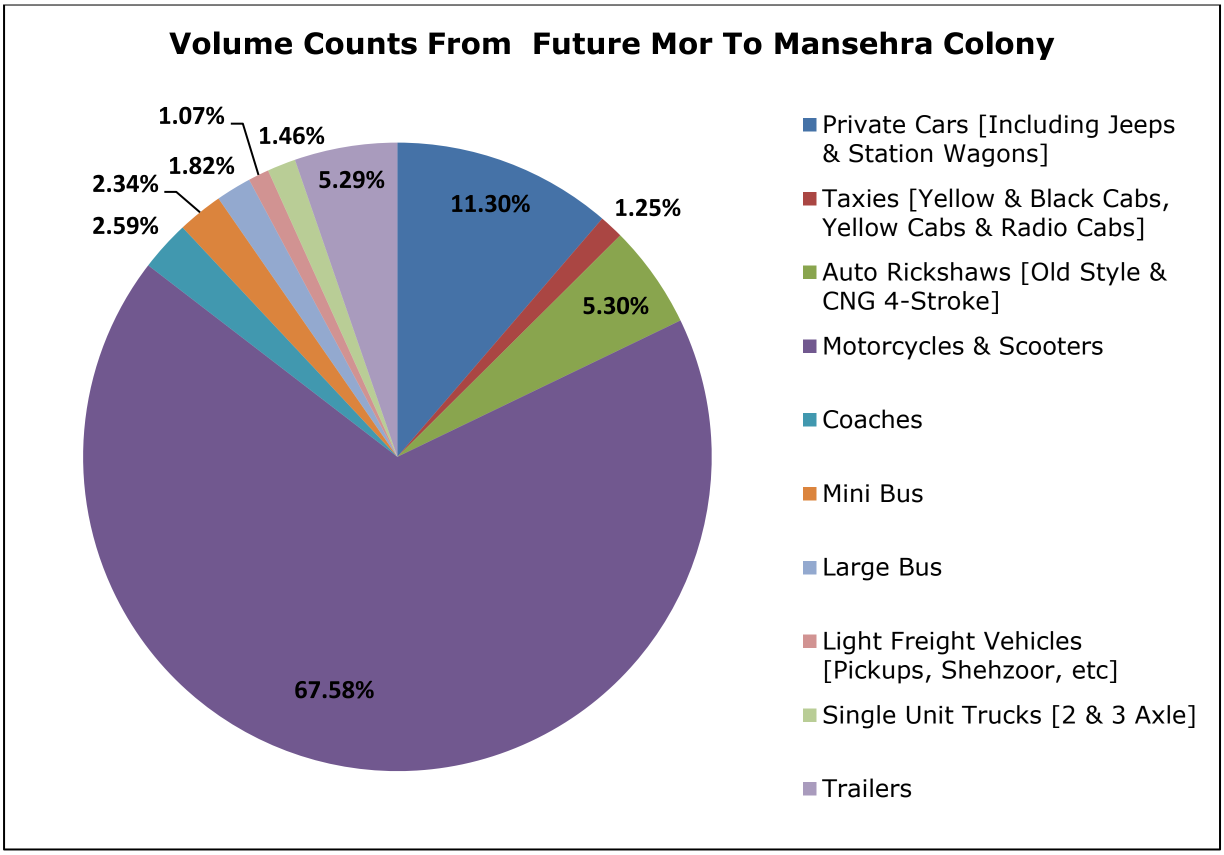


Figure 3.54: Volume Counts from Future Mor to Mansehra Colony (VC-13)

Motorcycles constitute the largest vehicle share with 68%. Private Cars shares 12%. Rest of the modal distribution consists of Freight Vehicles which is 8%. Public Transport includes Mini Bus, Large Bus and Coaches have 7.82% also Para Transit makes 6.75% share of vehicular mix.

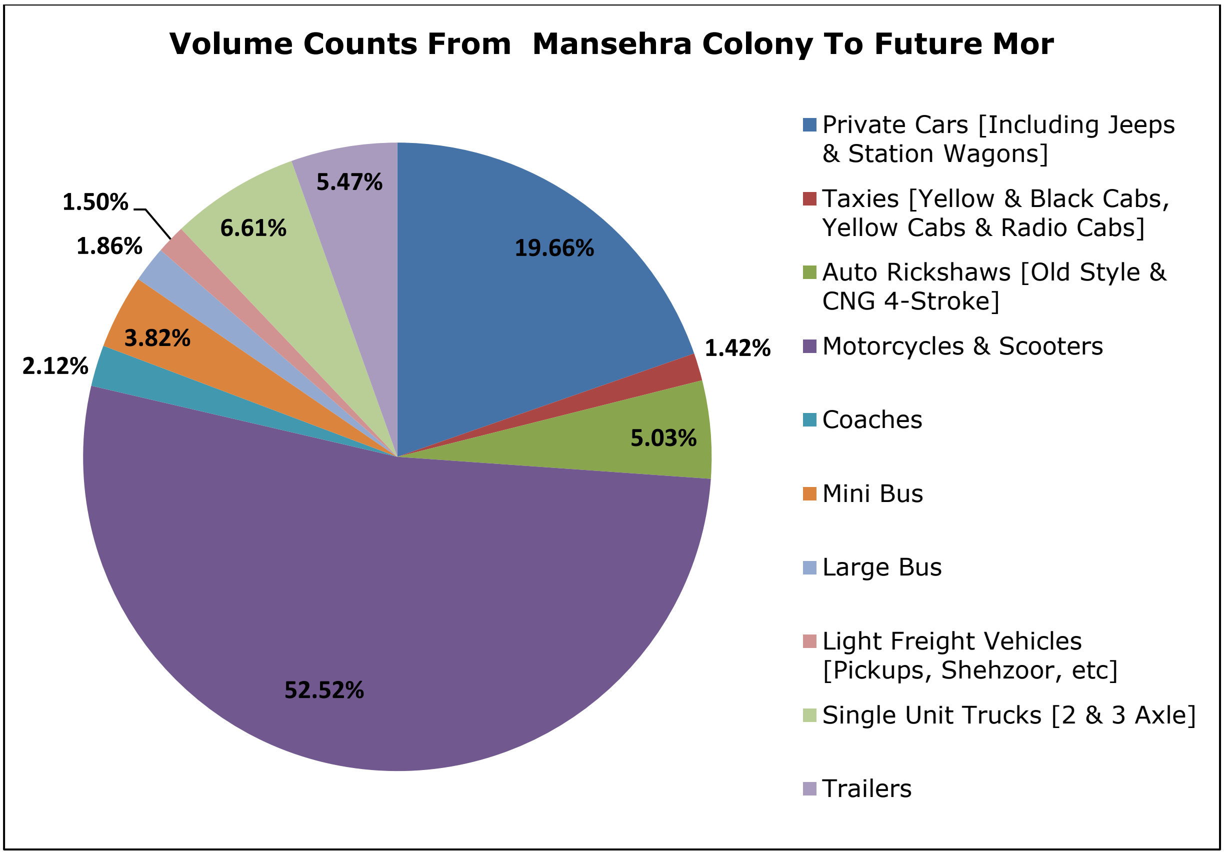


Figure 3.55: Volume Counts from Mansehra Colony to Future Mor (VC-13)

Motorcycles constitute the largest vehicle share with 52%. Private Cars shares 20%. Rest of the modal distribution consists of Freight Vehicles which is 13%. Public Transport includes Mini Bus, Large Bus and Coaches have 8% also Para Transit makes 6% share of vehicular mix.

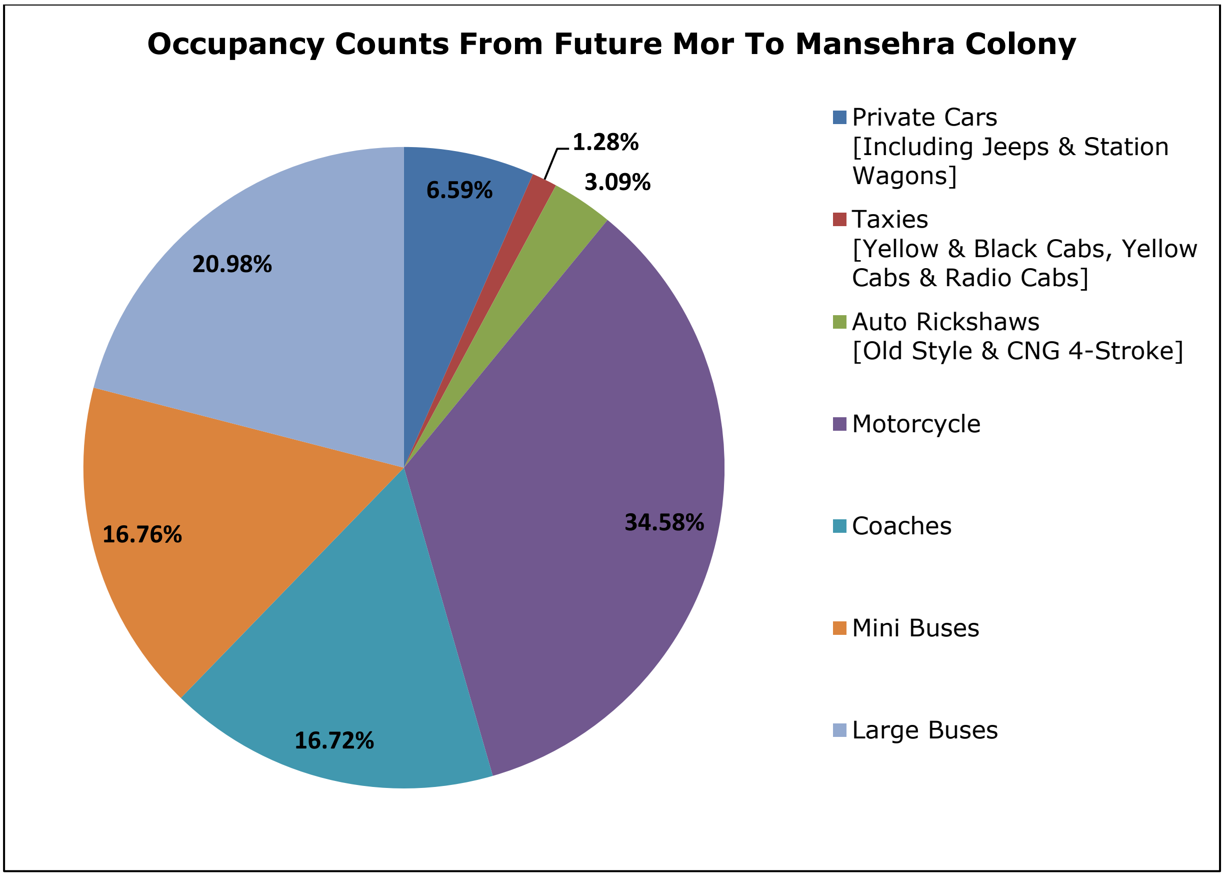


Figure 3.56: Occupancy Counts from Future Mor to Mansehra Colony (OC-13)

Occupancy rate for Public Transport is very high around 54% passengers counts in single direction from Future Mor to Mansehra Colony. Motorcycles are the second highest which makes 34% occupant. Private Cars are 7% occupant. Para Transit makes less than 5% share.

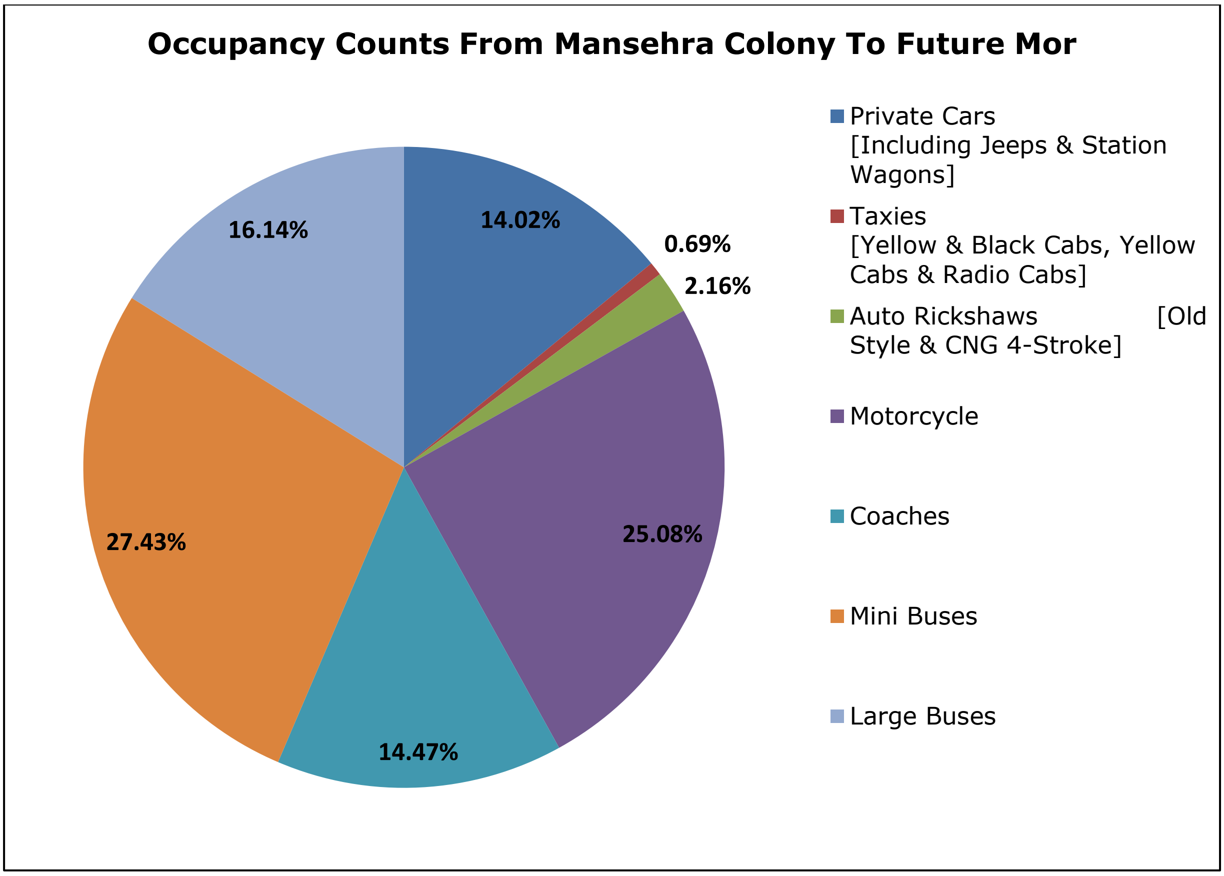


Figure 3.57: Occupancy Counts from Mansehra Colony to Future Mor (OC-13)

Occupancy rate for Public Transport is very high around 58% passengers counts in single direction from Mansehra Colony to Future Mor. Motorcycles are the second highest which makes 25% occupant. Private Cars are 14% occupant. Para Transit makes less than 4% share.

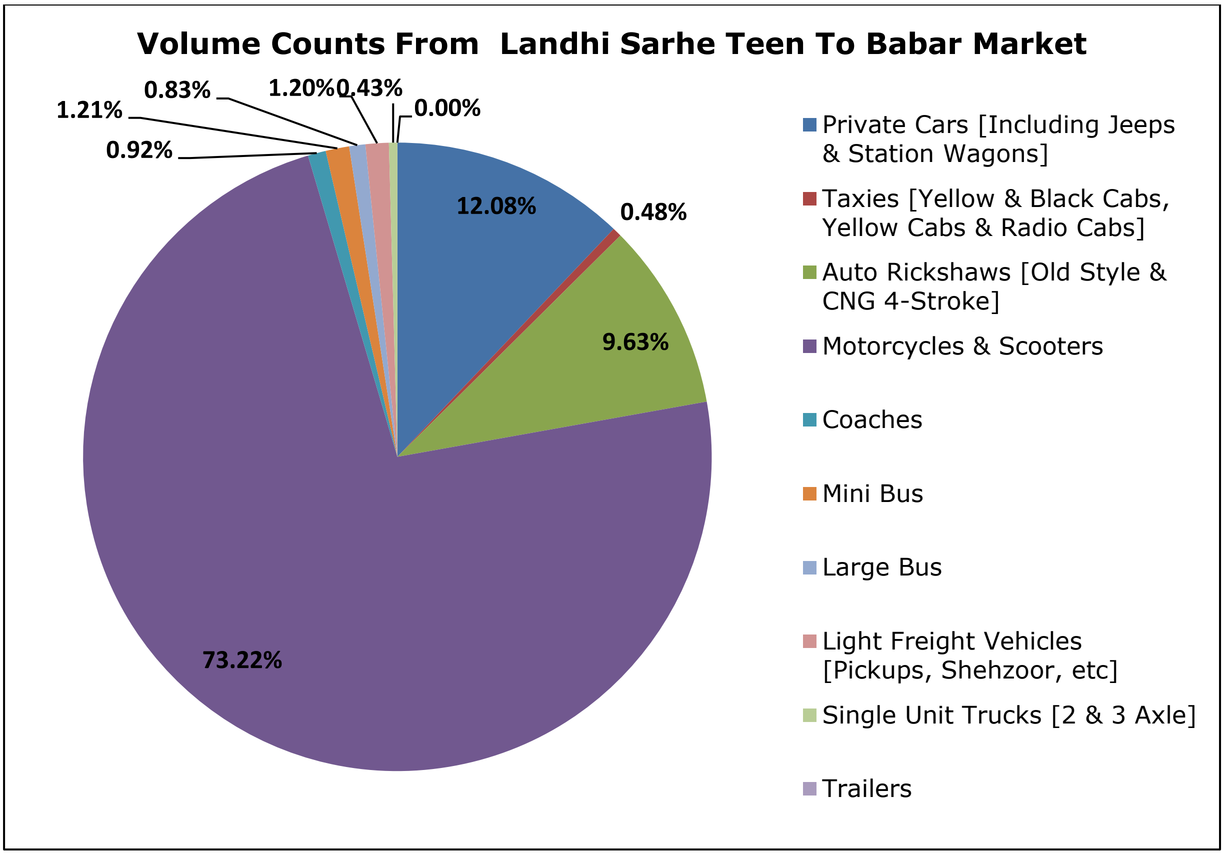


Figure 3.58: Volume Counts from Landhi Sarhe to Babar Market (VC-14)

Motorcycles constitute the largest vehicle share with 73%, followed by Private Cars with 12%. ParaTransit includes Taxies and Rickshaws share in the total vehicle fleet is 11%. Rest of the modal distribution consists of Freight Vehicles is 3% and Public Transport have less than 4% share.

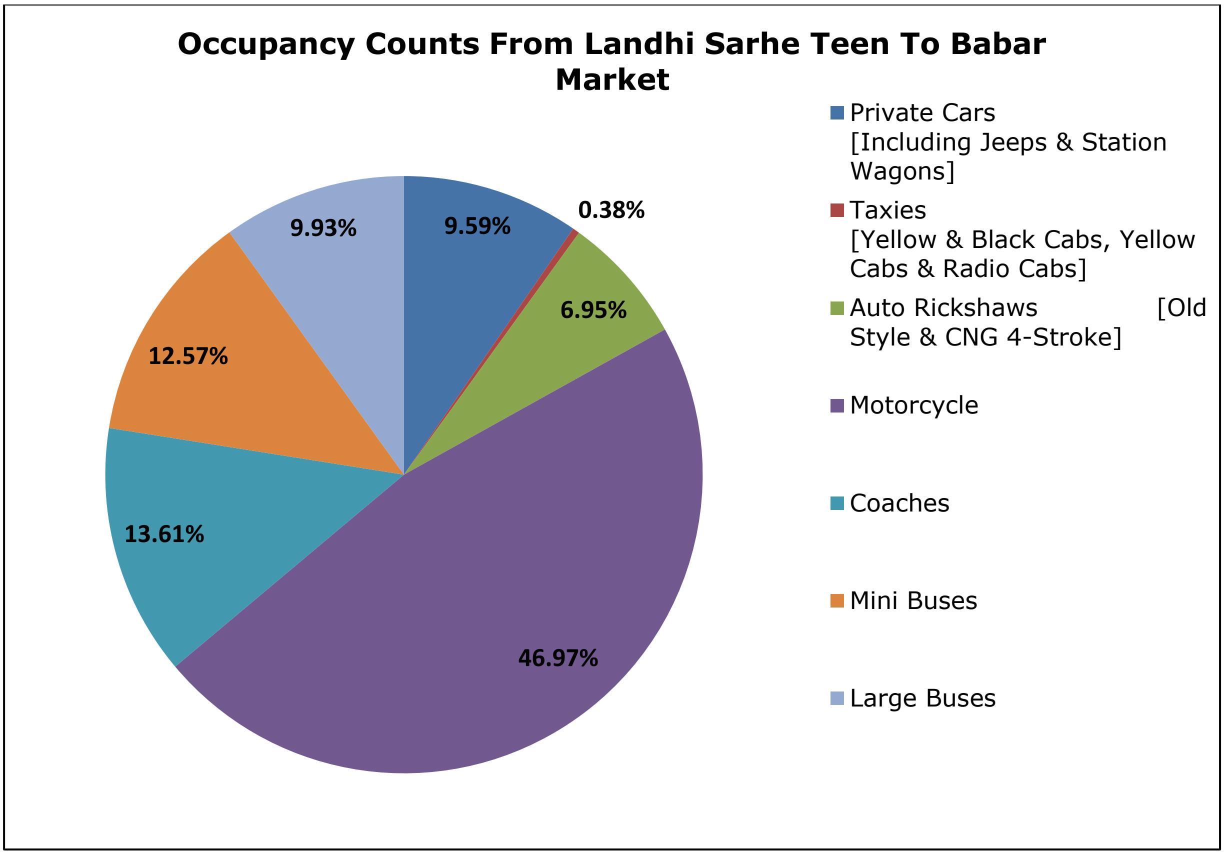


Figure 3.59: Occupancy Count from Landhi Sarhe to Babar Market (OC-14)

Occupancy rate for Motorcycle is very high around 47% passengers counts in single direction from Landhi Sarhe to Babar Market. Public Transport is the second highest which makes 36% of vehicular mix. Private Cars are 10% occupant. Para Transit makes less than 10% share.

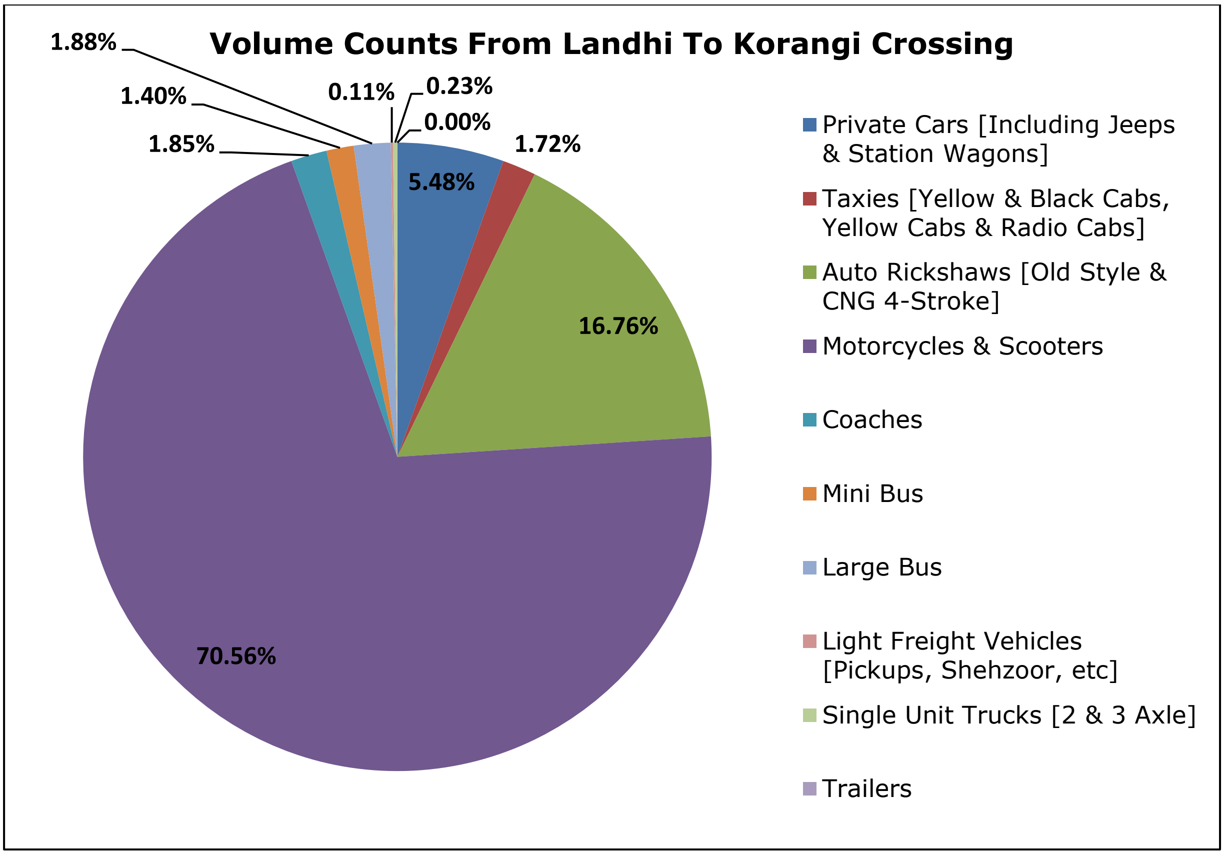


Figure 3.60: Volume Counts from Landhi to Korangi Crossing (VC-15)

Motorcycles constitute the largest vehicle share with 70.56%, followed by Private Cars with 5.48%. Para Transit share in the total vehicle fleet is high at 18.48%. Rest of the modal distribution consists of Freight Vehicles is less than 1% and Public Transport have 5.13%.

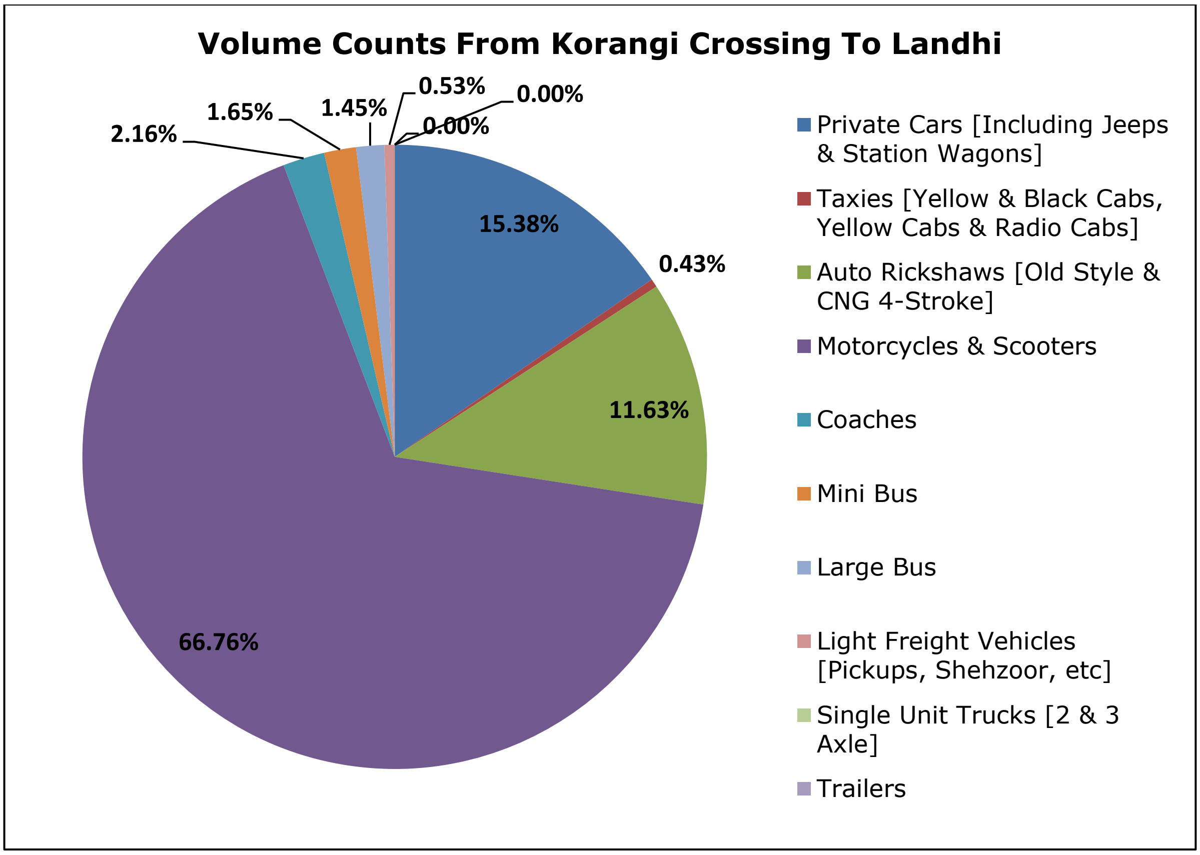


Figure 3.61: Volume Counts from Korangi Crossing to Landhi (VC-15)

Motorcycles constitute the largest vehicle share with 66.76%, followed by Private Cars with 15.38%. Para Transit share in the total vehicle fleet is high at 12.06%. Rest of the modal distribution consists of Freight Vehicles is less than 1% and Public Transport have 5.26%.

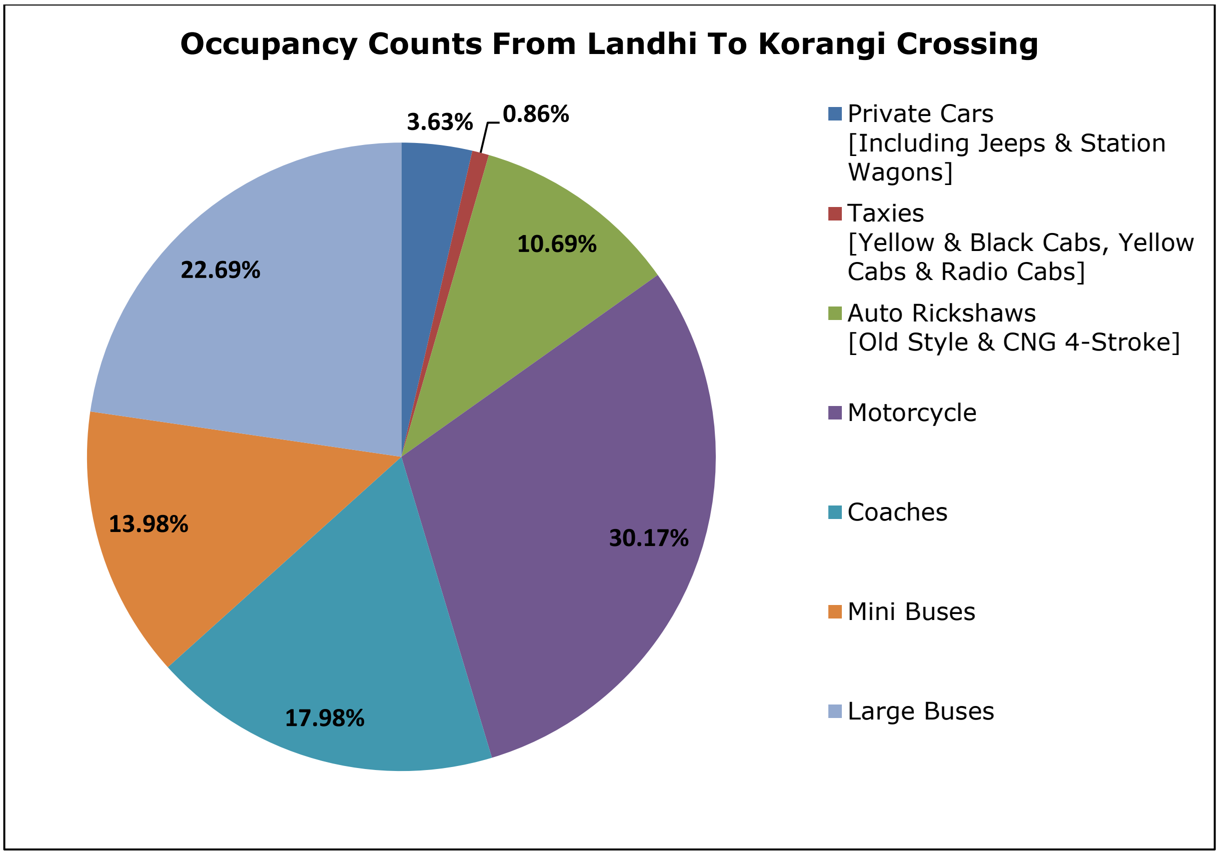


Figure 3.62: Occupancy Count from Landhi to Korangi Crossing (OC-15)

Occupancy rate for Public Transport is very high around 54.65% passengers counts in single direction from Landhi to Korangi Crossing. Motorcycle is the second highest which makes 30.17% of vehicular mix. Para Transit is 11.5% occupant. Private Cars makes less than 5% share.

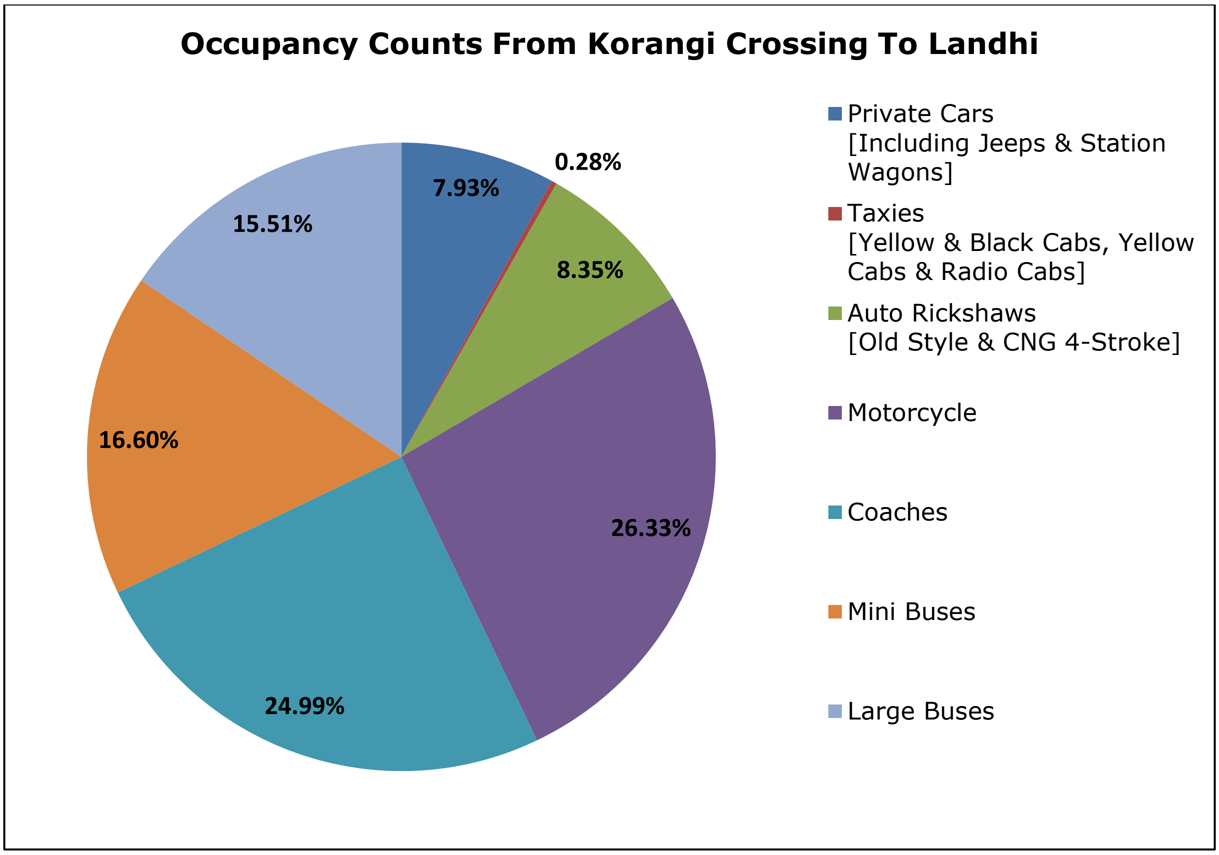


Figure 3.63: Occupancy Count from Korangi Crossing to Landhi (OC-15)

Occupancy rate for Public Transport is very high around 57.90% passengers counts in single direction from Korangi Crossing to Landhi. Motorcycle is the second highest which makes 26.3% of vehicular mix. Para Transit is 8.63% occupant. Private Cars makes less than 10% share.

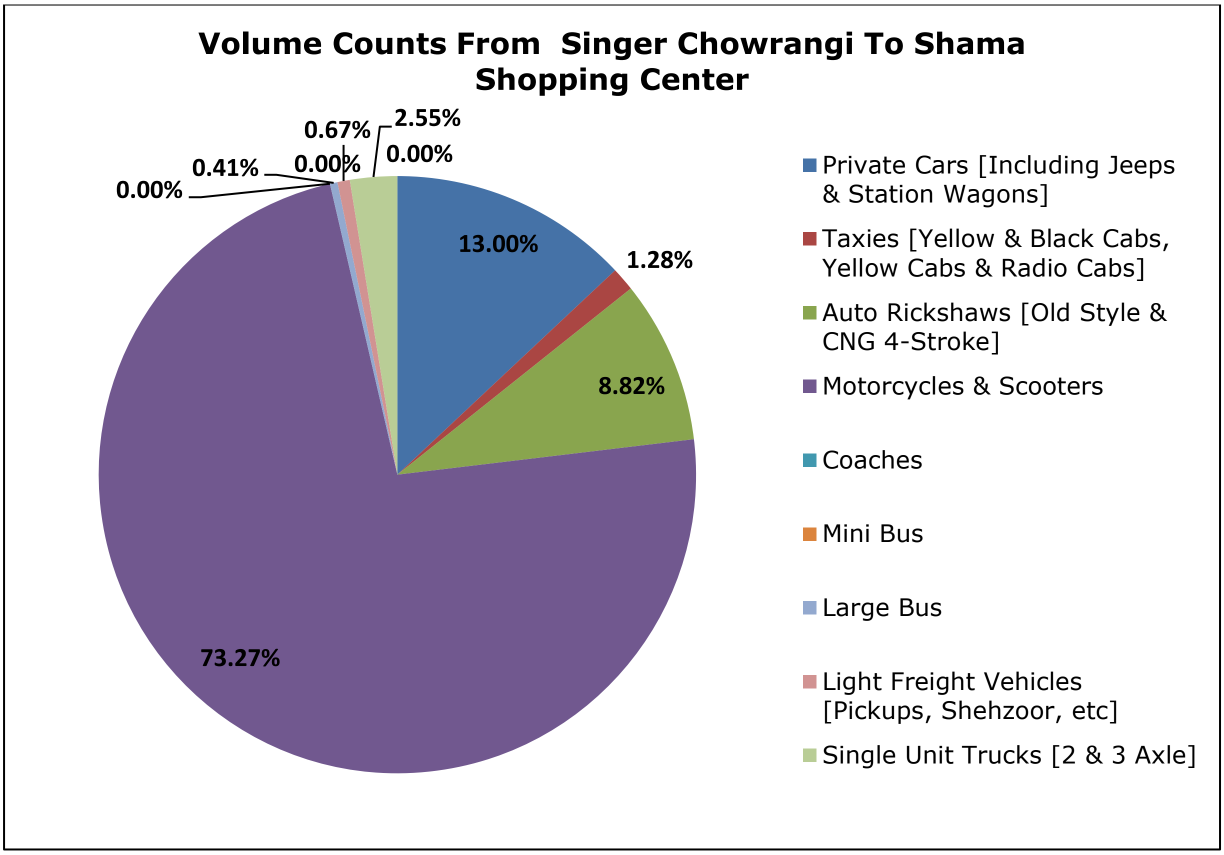


Figure 3.64: Volume Counts from Singer Chowrangi to Shama Shopping Center (VC-16)

Motorcycles constitute the largest vehicle share with 73.27%, followed by Private Cars with 13%. Para transit includes Taxis and Auto Rickshaw share in the total vehicle mix are 10%. Rest of the modal distribution consists of Freight Vehicles and Public Transport.

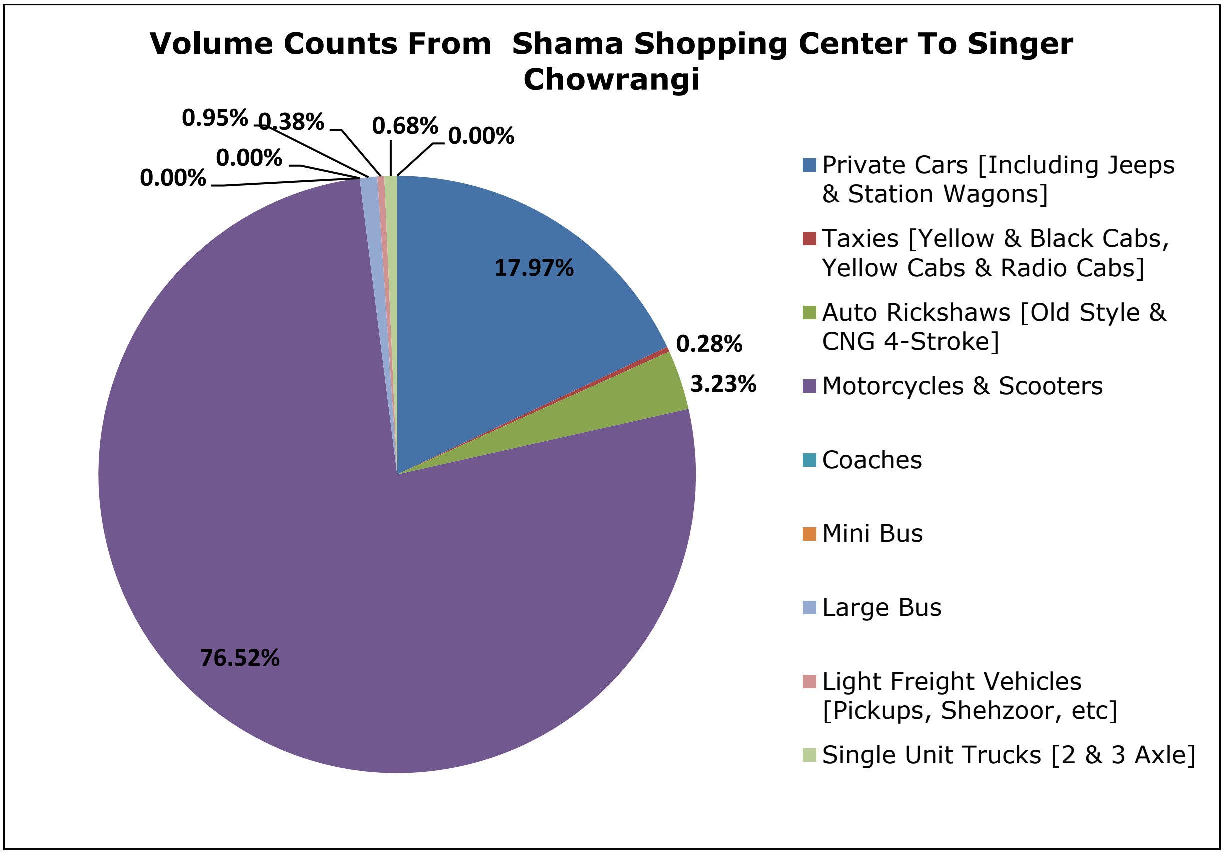


Figure 3.65: Volume Counts from Shama Shopping Center to Singer Chowrangi to (VC-16)

Motorcycles constitute the largest vehicle share with 76.52%, followed by Private Cars with 18%. Para transit includes Taxis and Auto Rickshaw share in the total vehicle mix are 4%. Rest of the modal distribution consists of Freight Vehicles and Public Transport.

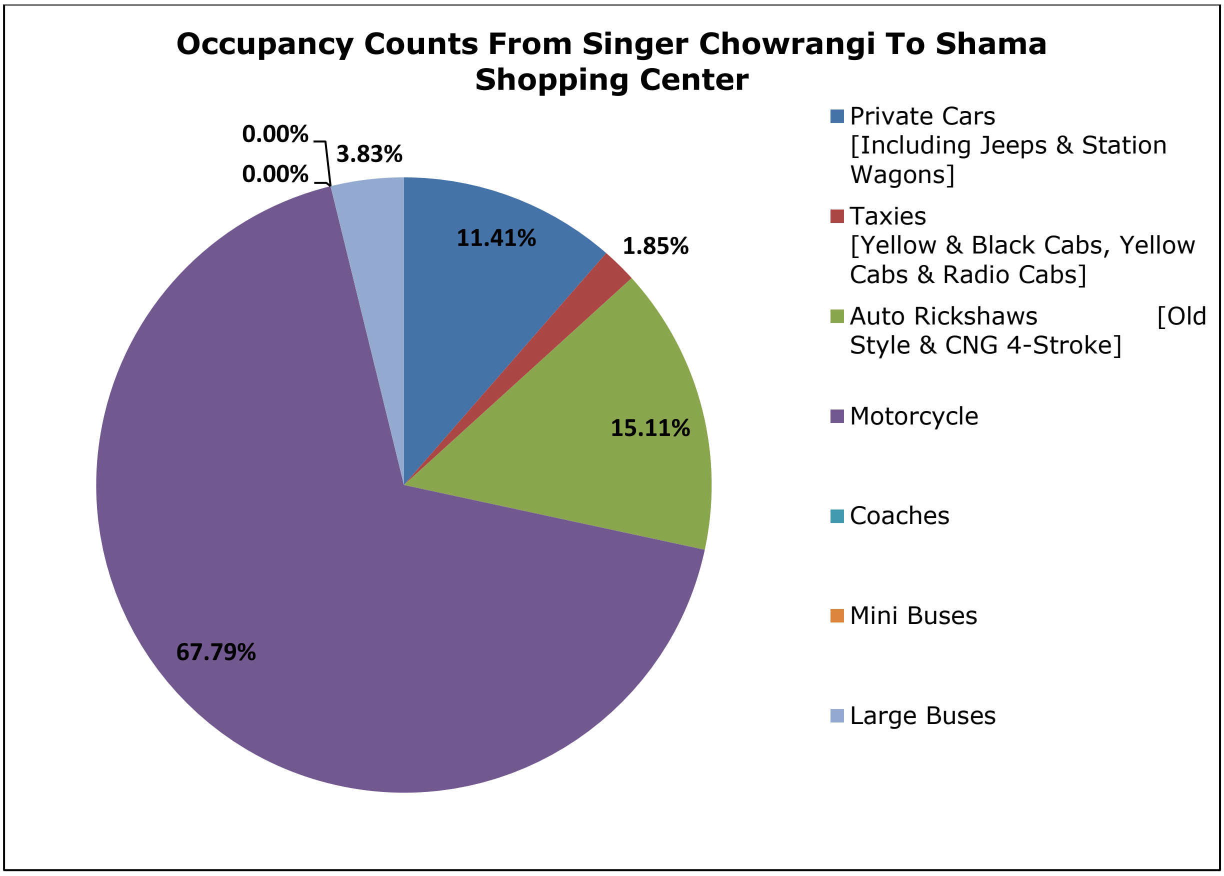


Figure 3.66: Occupancy Counts from Singer Chowrangi to Shama Shopping Center (OC-16)

In this area occupancy rate for Motorcycle is very high around 68% passengers counts in single direction from Singer Chowrangi to Shama Shopping Center. Para Transit is the second highest which makes 17% also Private cars are 11% occupant. Public Transport shares less than 5%.

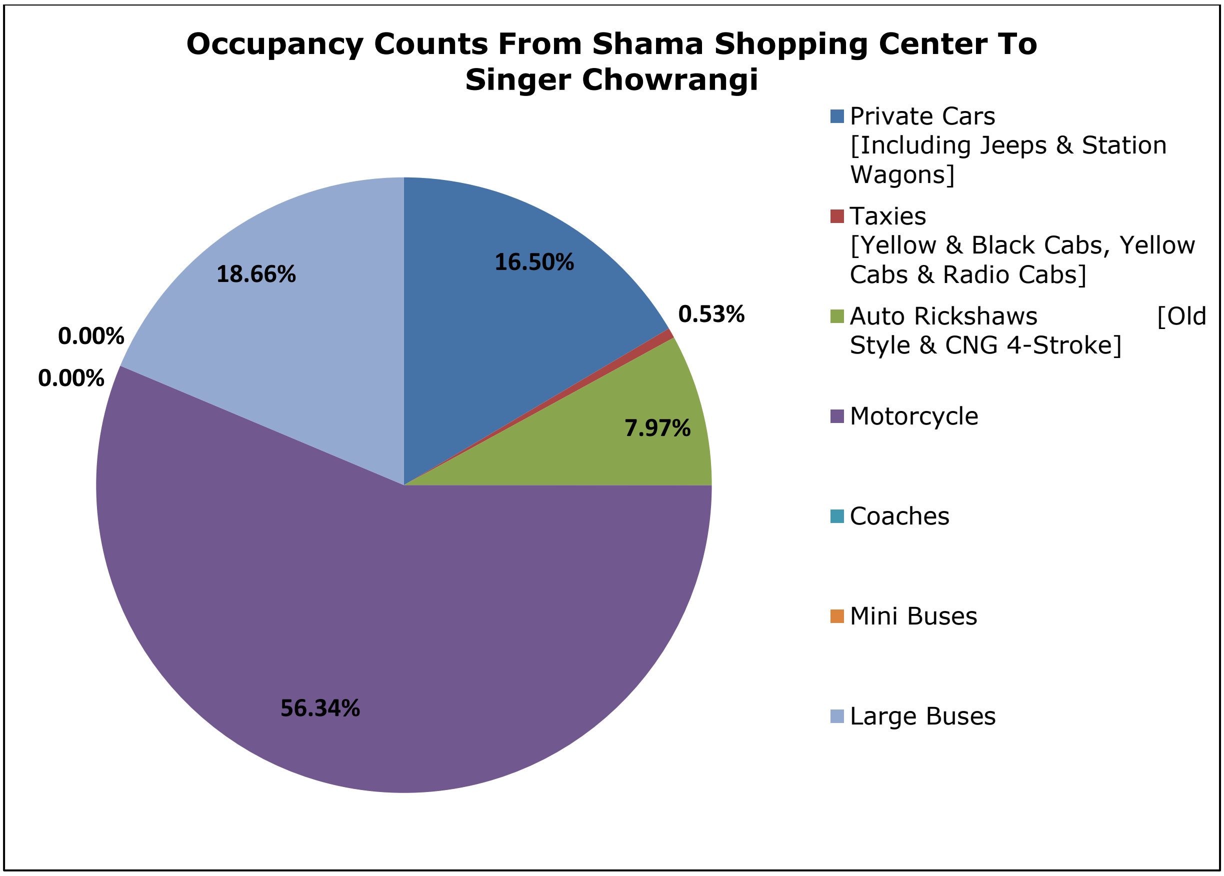


Figure 3.67: Occupancy Counts from Shama Shopping Center to Singer Chowrangi (OC-16)

In this area occupancy rate for Motorcycle is very high around 56% passengers counts in single direction from Shama Shopping Center to Singer Chowrangi. Public transport is the second highest which makes 19%. Private cars share 17% and Para Transit is 9% occupant.

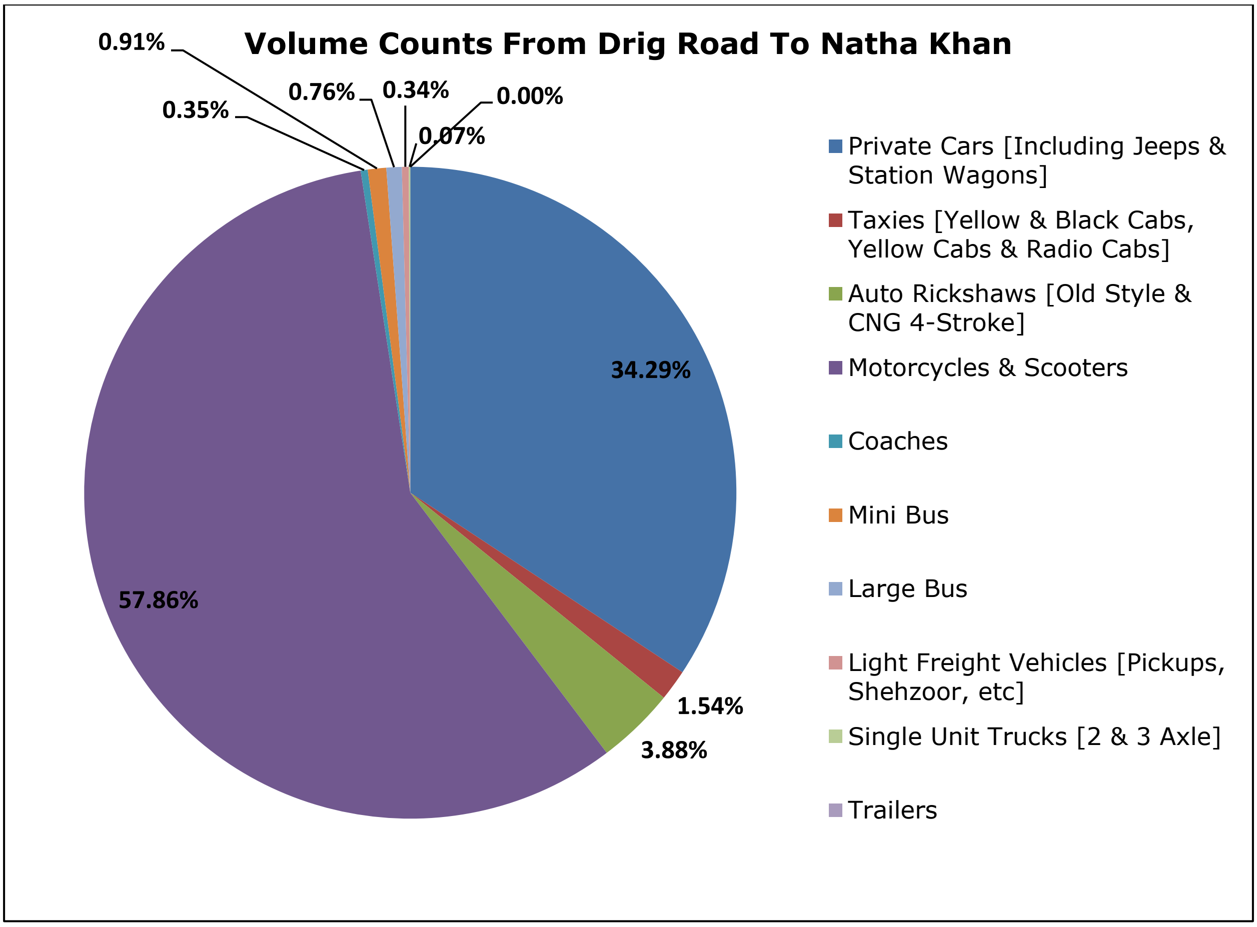


Figure 3.68: Volume Counts from Drig Road to Natha Khan (VC-17)

Motorcycles are in high number at this location which constitutes around 57.86% of vehicular mix. Out of other modal classifications, Private Cars have high share i.e 34.29% share, Public and freight Transport have less share in terms of modal split that is 0.76% and 0.41% respectively also Para Transit have 5.42% modal share.

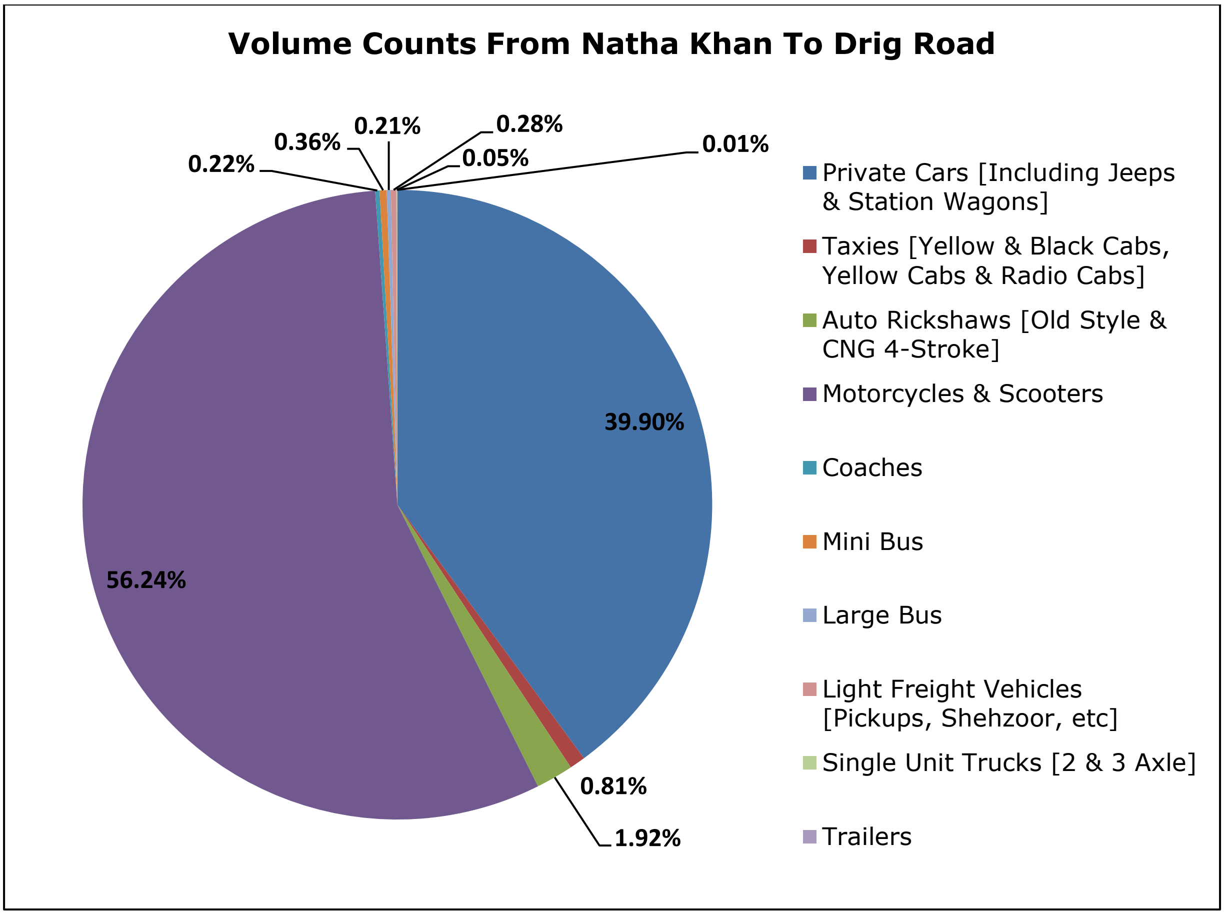


Figure 3.69: Volume Counts from Natha Khan to Drig Road (VC-17)

Motorcycles are in high number at this location which constitutes around 56.24% of vehicular mix. Out of other modal classifications, Private Cars have high share i.e 39.90% share, Public and freight Transport have less share in terms of modal split that is 0.79% and 0.34% respectively also Para Transit have 2.73% modal share.

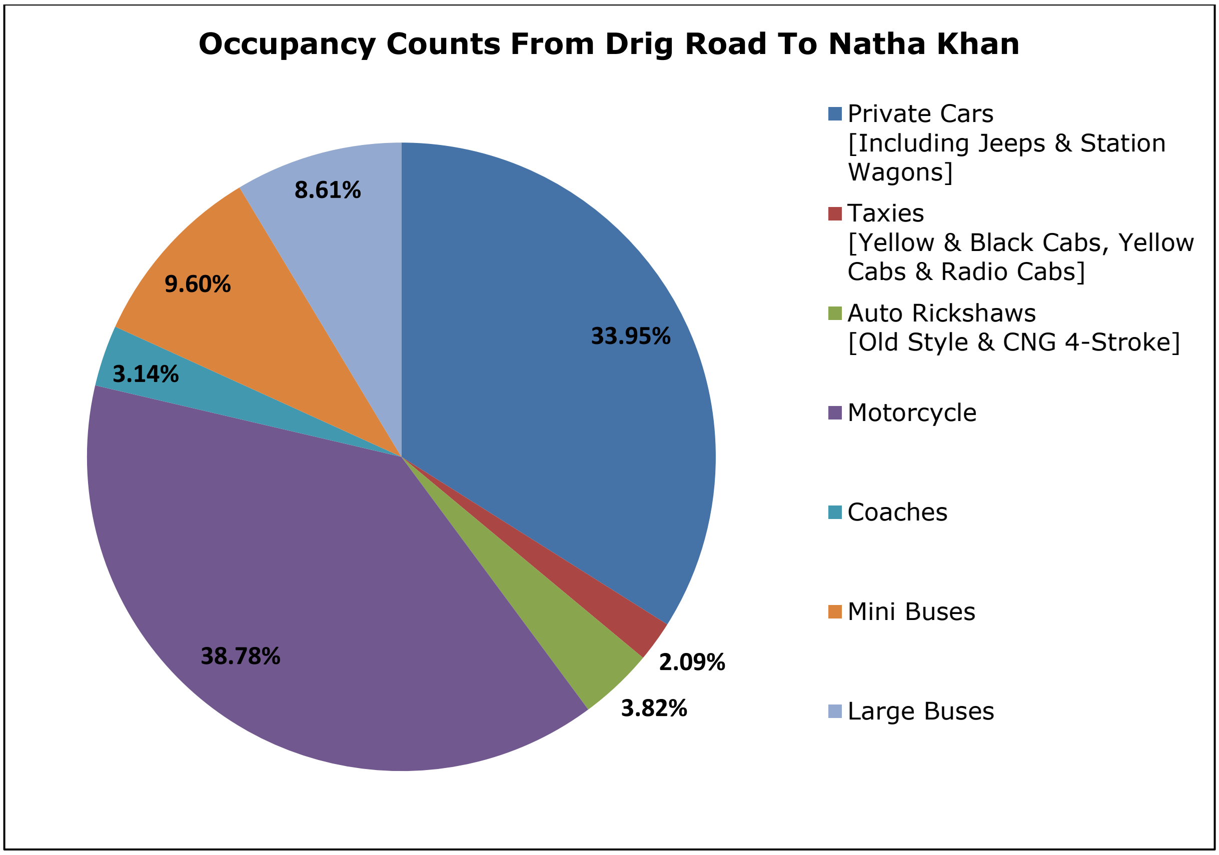


Figure 3.70: Occupancy Counts from Drig Road to Natha Khan (OC-17)

In this area occupancy rate for Motorcycle is very high around 38.78% passengers counts in single direction from Drig Road to Natha Khan Road. Private cars are the second highest which makes 33.9%. Public transport shares 21.4% and Para Transit is 6% occupant.

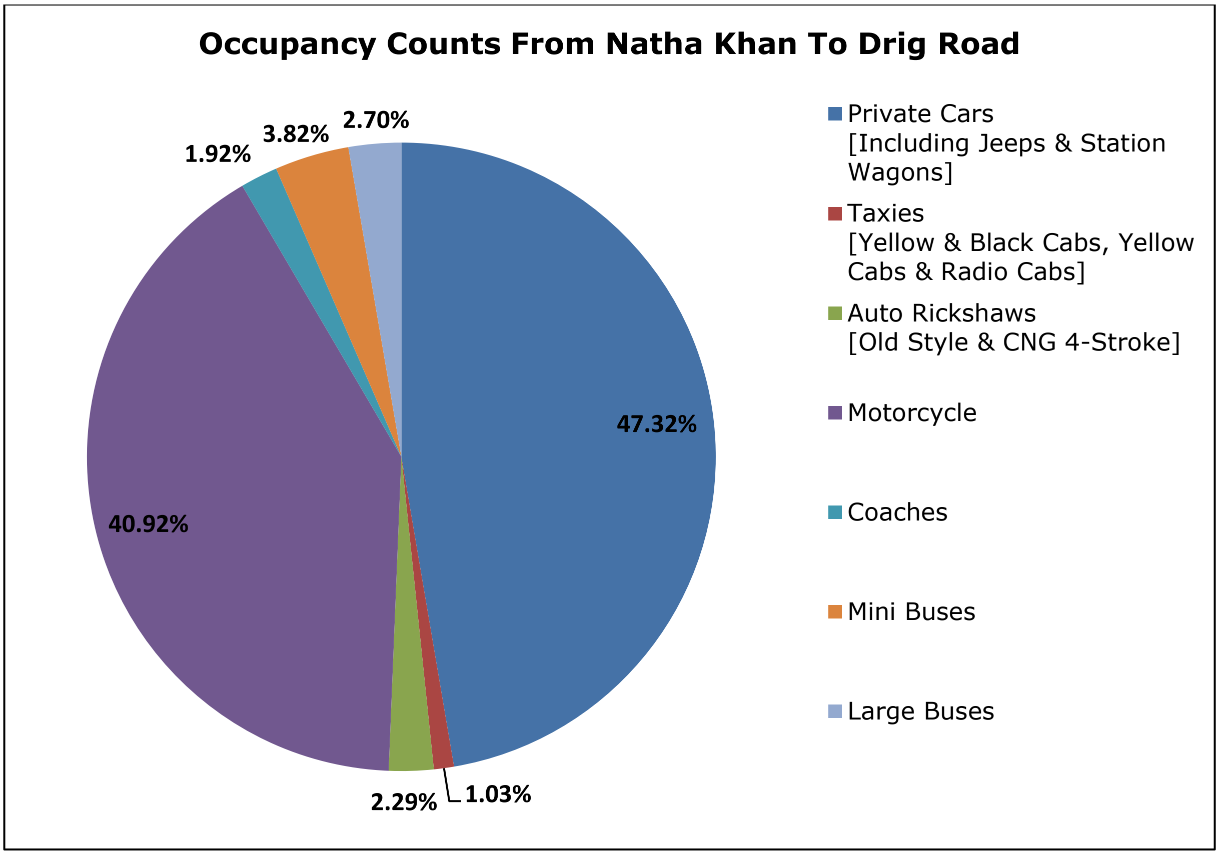


Figure 3.71: Occupancy Counts from Natha Khan to Drig Road (OC-17)

In this area occupancy rate for Private cars is very high around 47.32% passengers counts in single direction from Natha Khan to Drig Road. Motorcycles are the second highest which makes 40.92%. Public transport shares 8.44% and Para Transit is 3.32% occupant.

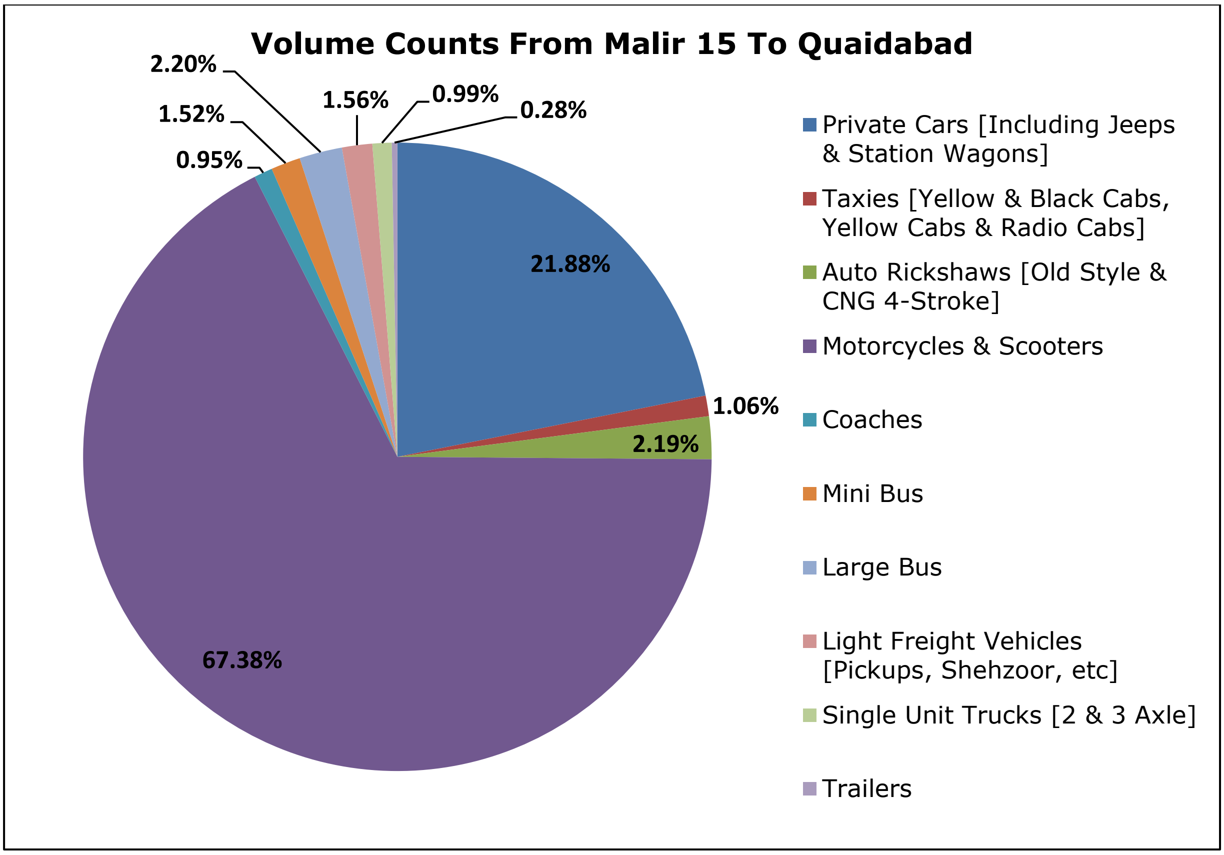


Figure 3.72: Volume Counts from Malir 15 to Quaidabad (VC-18)

In this segment, where only Motorcycles have constituted half of the modal split having 68% share. Among rest of the traffic Private Cars are predominant having 22% modal share whereas rickshaws and taxis constitutes almost 3% and the Public Transport constitutes almost 5 % and freight vehicles are 3%.

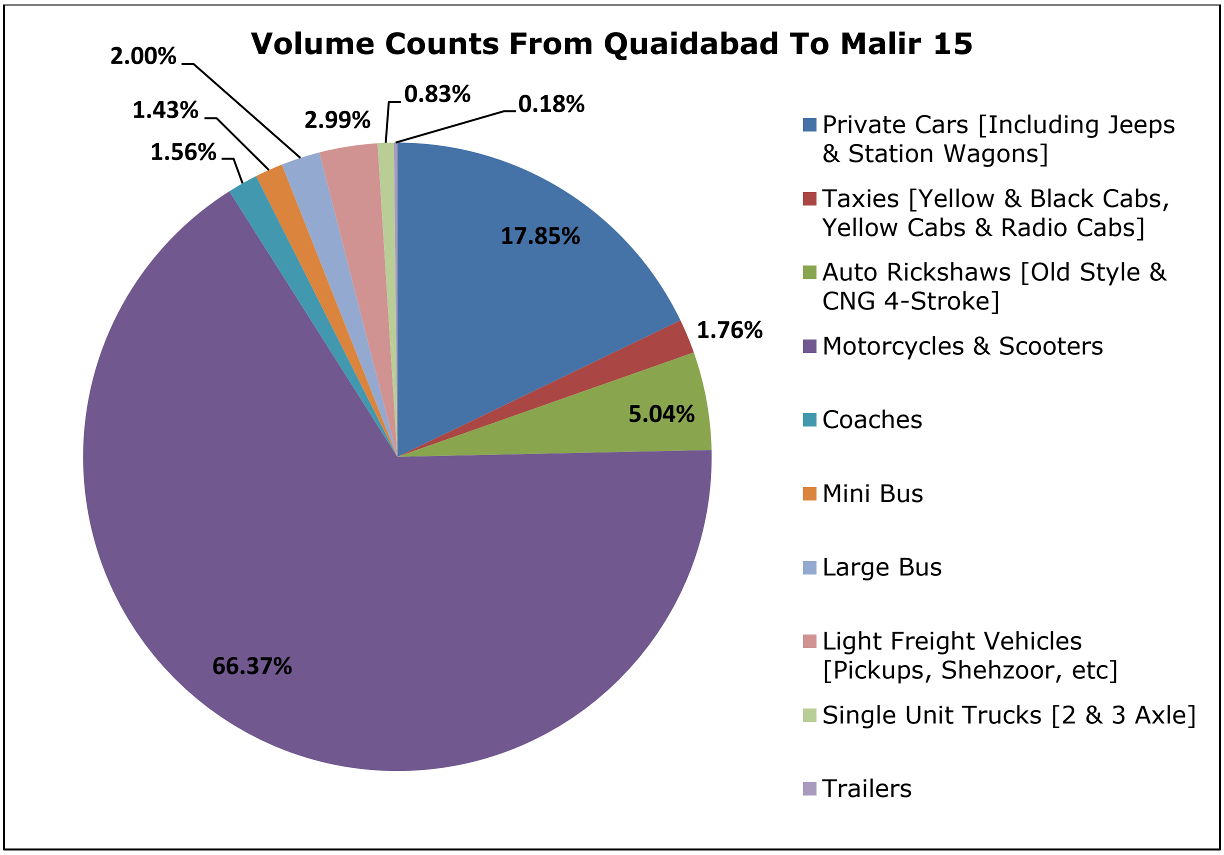


Figure 3.73: Volume Counts from Quaidabad to Malir 15 (VC-18)

In this segment, similar is the trend where only Motorcycles constitute half of the modal split having 67% share. Among rest of the traffic Private Cars are predominant having 18% modal share whereas rickshaws and taxis constitutes almost 6.8% and the Public Transport constitutes almost 5 % and freight vehicles are 4%.

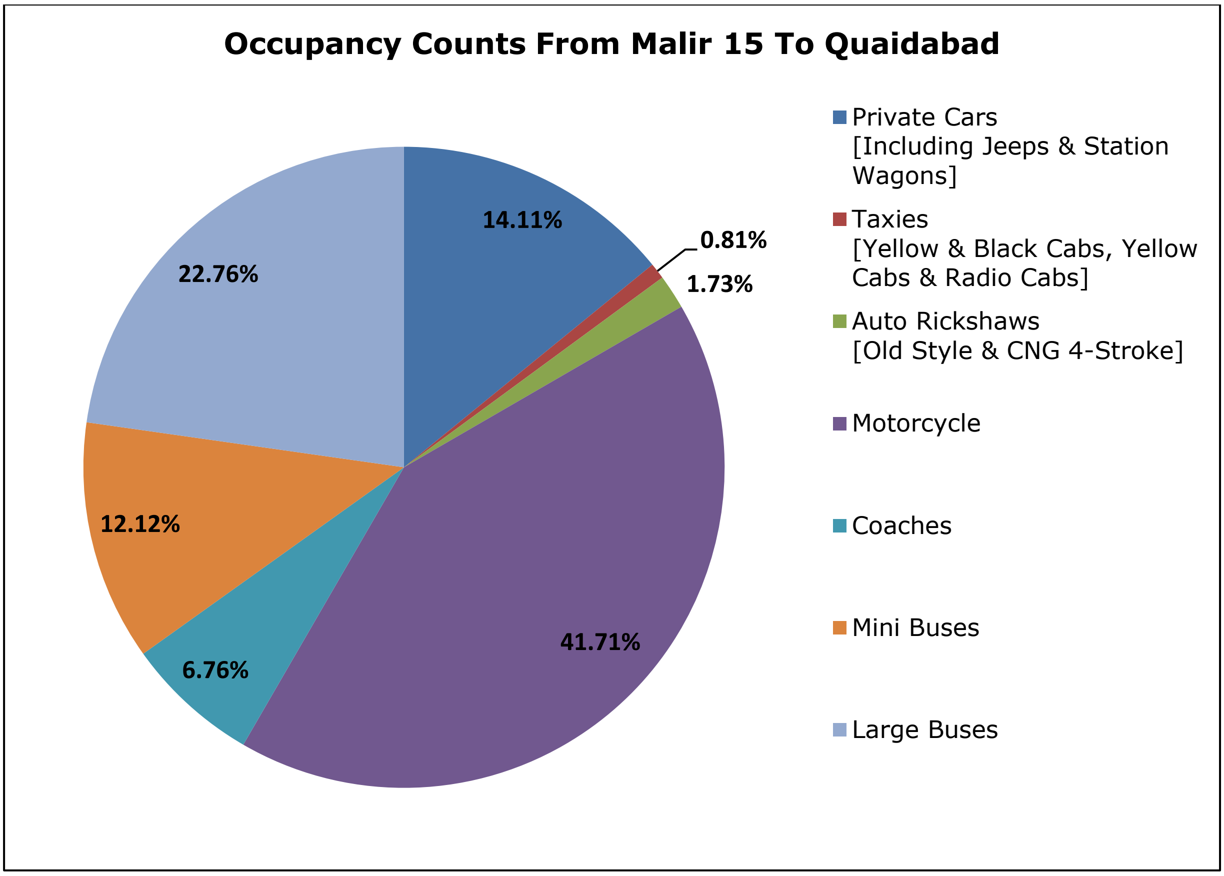


Figure 3.74: Occupancy Counts from Malir 15 to Quaidabad (OC-18)

In this area occupancy rate for Motorcycles is very high around 42% passengers counts in single direction from Malir 15 to Quaidabad. Public Transport is the second highest which makes 41%. Private cars are 14.11% occupant. Para transit makes less than 4% share.

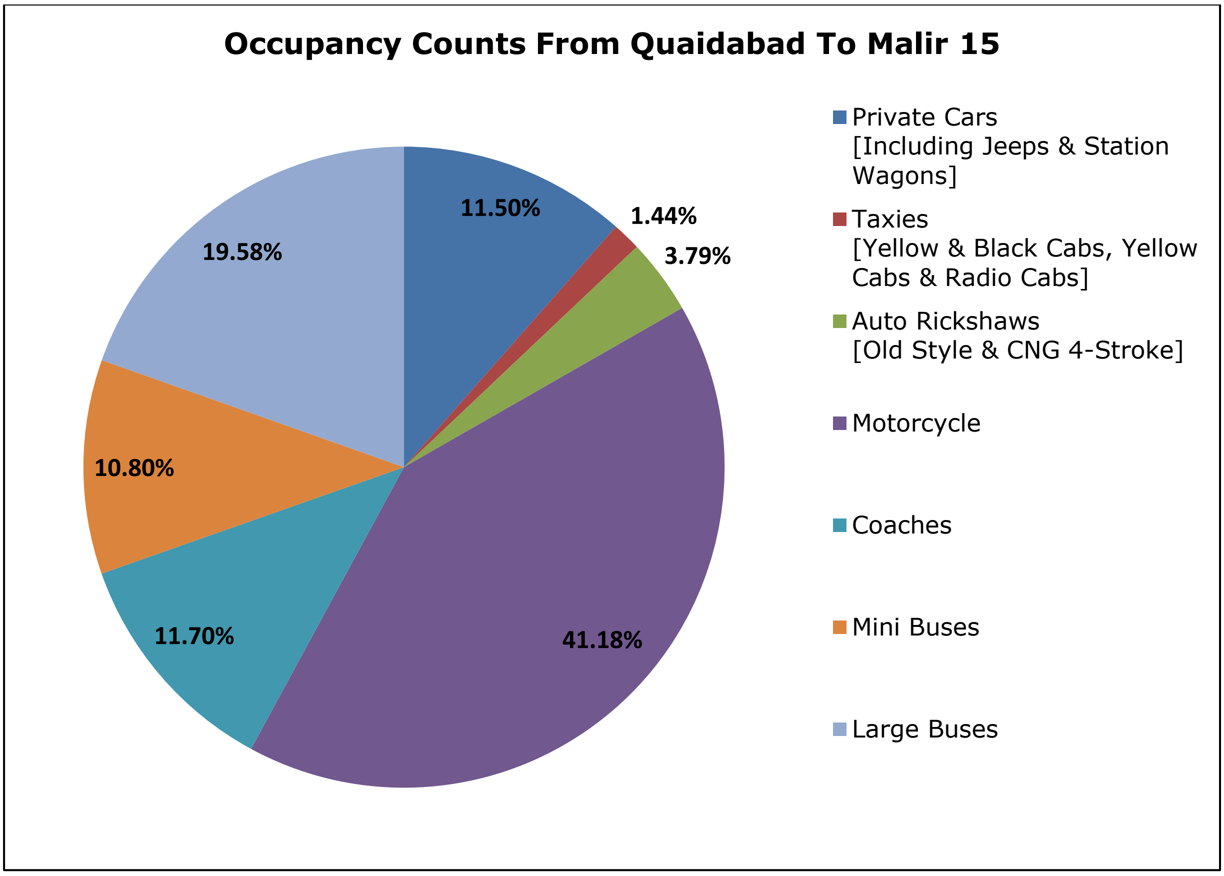


Figure 3.75: Occupancy Counts from Quaidabad to Malir 15 (OC-18)

In this area occupancy rate for Public Transport is very high around 42% passengers counts in single direction from Malir 15 to Quaidabad. Motorcycles are the second highest which makes 41%. Private cars are 12% occupant. Para transit makes less than 5% share.

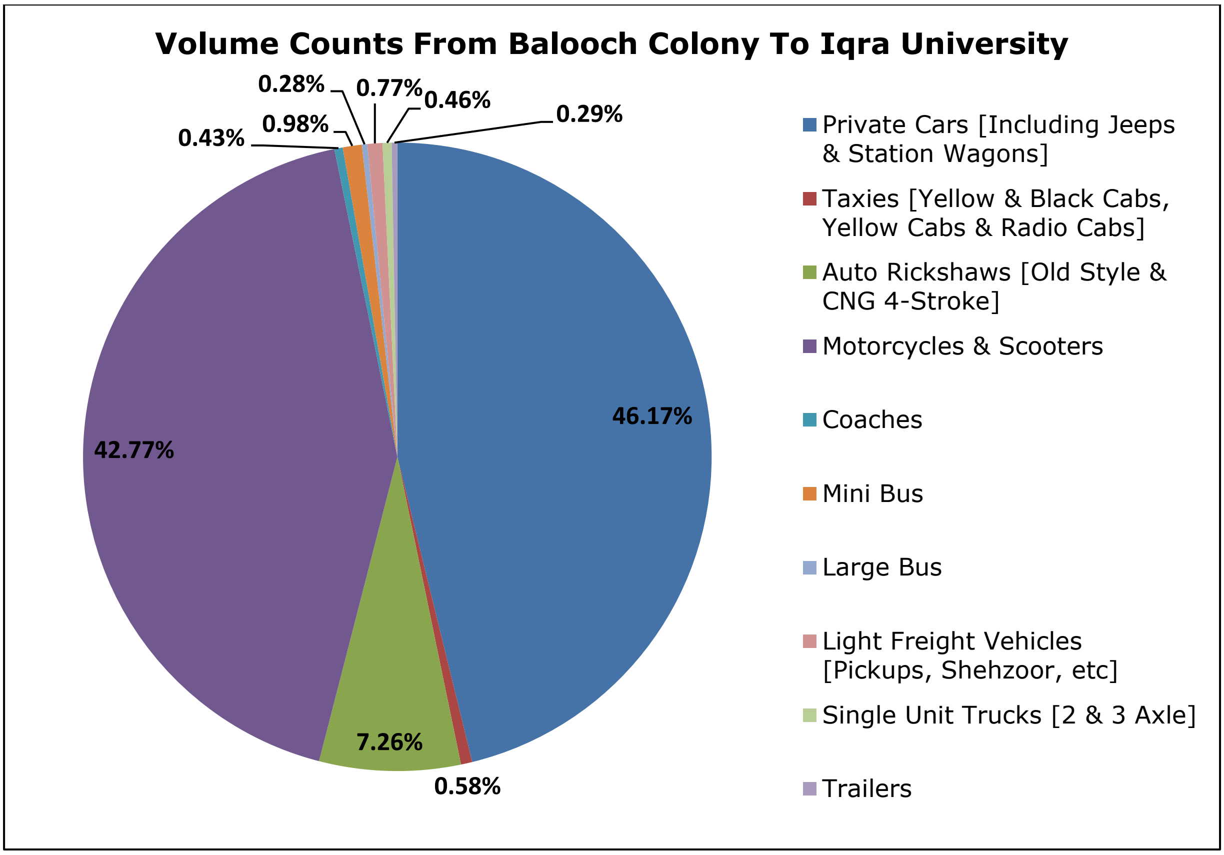


Figure 3.76: Volume Counts from Balooch Colony to Iqra University (VC-19)

Private cars are the most predominant mode of transport in the entire area. Motorcycles are the second highest which makes around 42.7%. Public Transport (all types included) only makes 1.69% of vehicular mix which clearly suggests the depriving trend of Public Transport availability for the residents of Karachi. Para Transit including Taxi and Rickshaws makes around 8% of the total vehicular share. Freight Traffic constitutes 1.52% of the total vehicular mix.

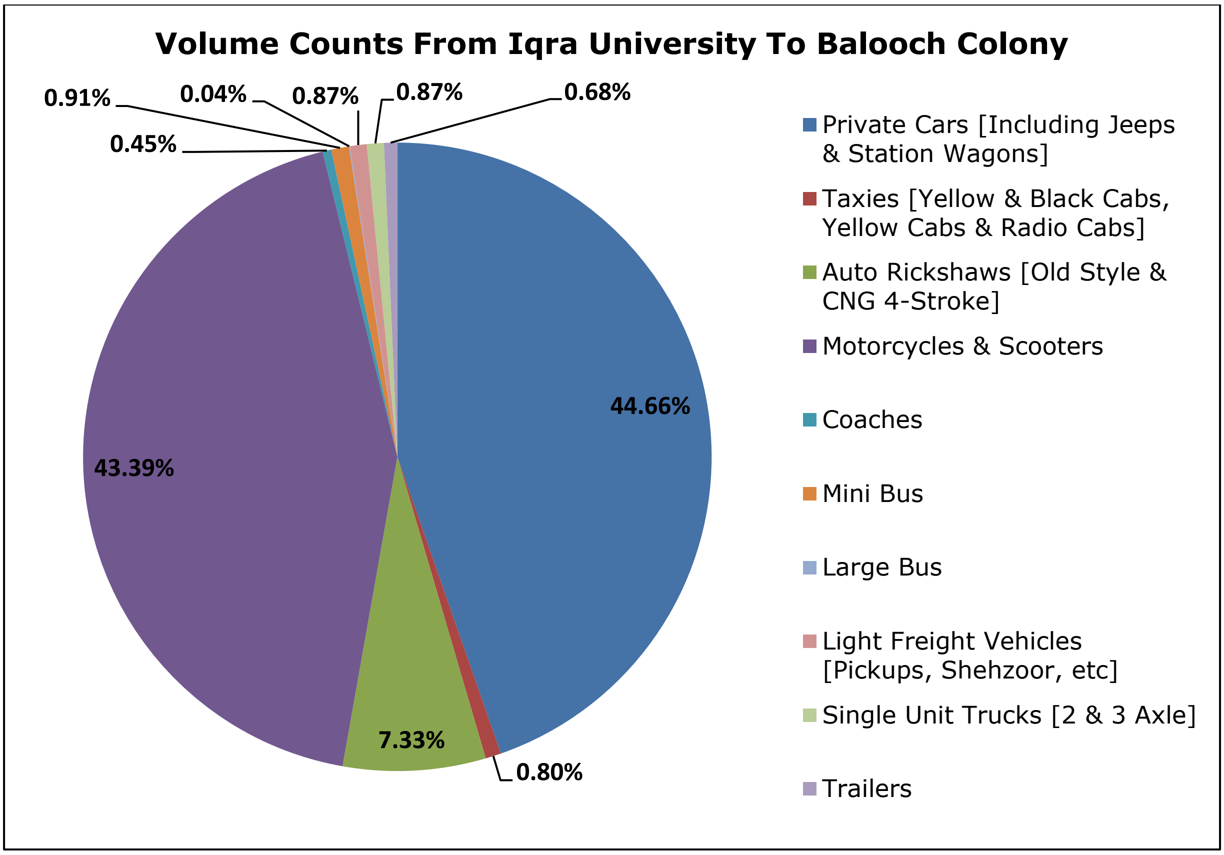


Figure 3.77: Volume Counts from Iqra University to Balooch Colony (VC-19)

Private cars are the most predominant mode of transport in the entire area. Motorcycles are the second highest which makes around 43%. Public Transport (all types included) only makes 1.4% of vehicular mix which clearly suggests the depriving trend of Public Transport availability for the residents of Karachi. Para Transit including Taxi and Rickshaws makes around 8% of the total vehicular share. Freight Traffic constitutes 2.42% of the total vehicular mix.

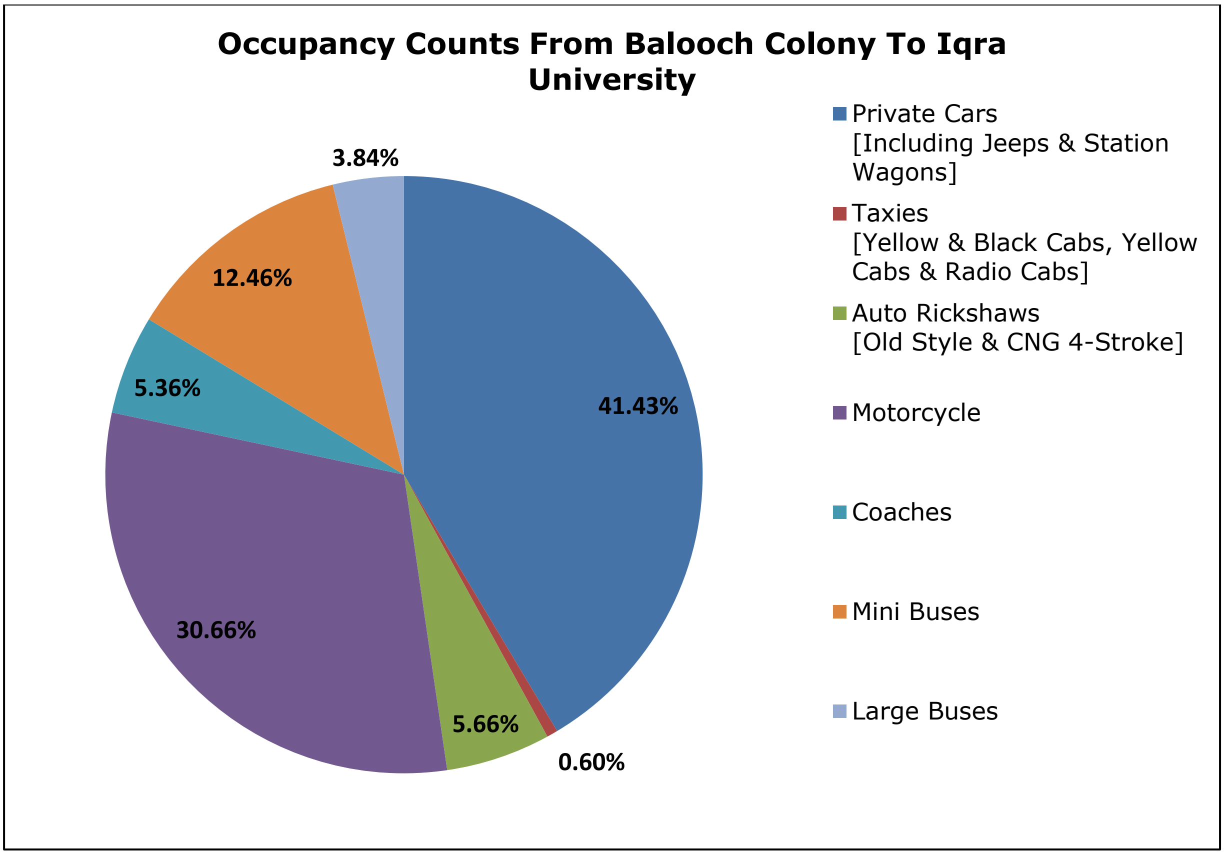


Figure 3.79: Occupancy Counts from Balooch Colony to Iqra University (OC-19)

In this area occupancy rate for Private Cars is very high around 41% passengers counts in single direction from Balooch Colony to Iqra University. Motorcycles are the second highest which makes 31%. Public Transport transit is 21% occupant and Para Transit makes 6.26% share.

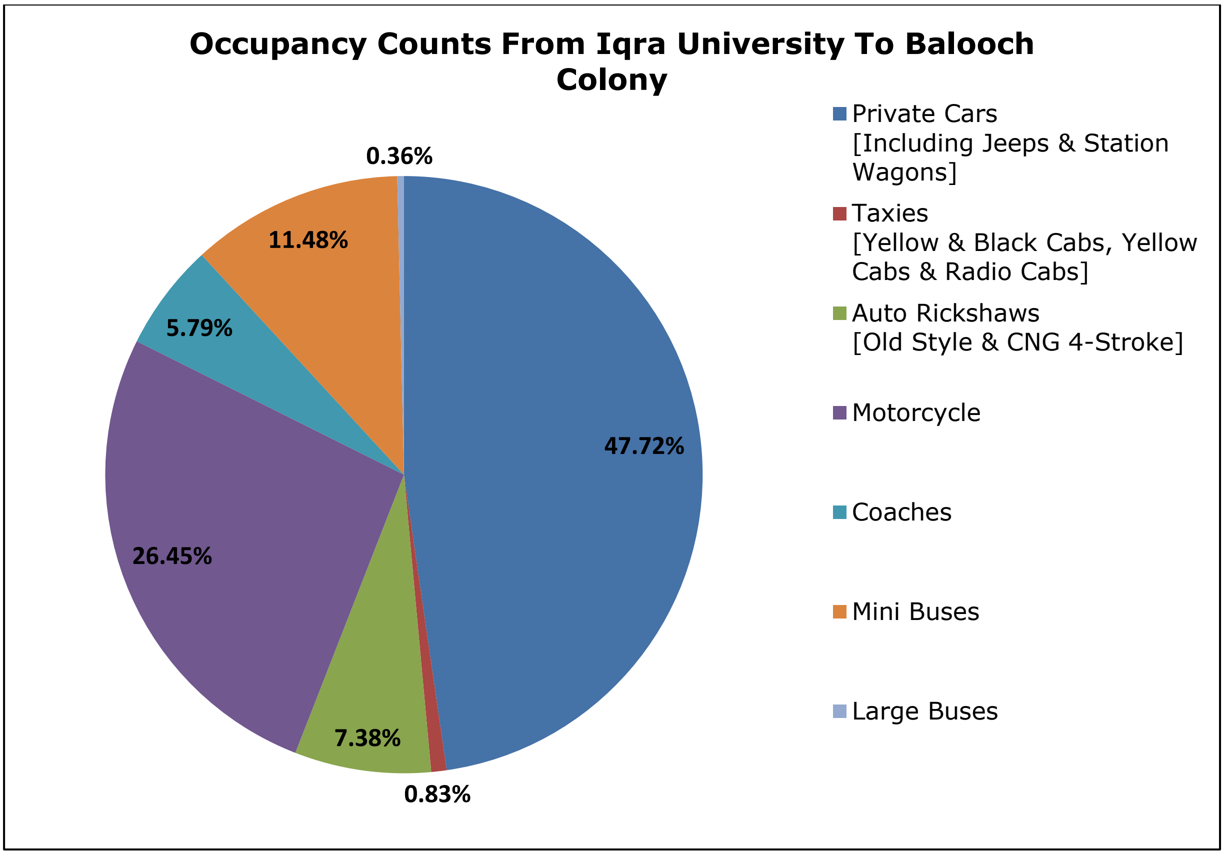


Figure 3.80: Occupancy Counts from Iqra University to Balooch Colony (OC-19)

In this area occupancy rate for Private Cars is very high around 48% passengers counts in single direction from Iqra University to Balooch Colony. Motorcycles are the second highest which makes 26%. Public Transport transit is 17% occupant and Para Transit makes 8.21% share.

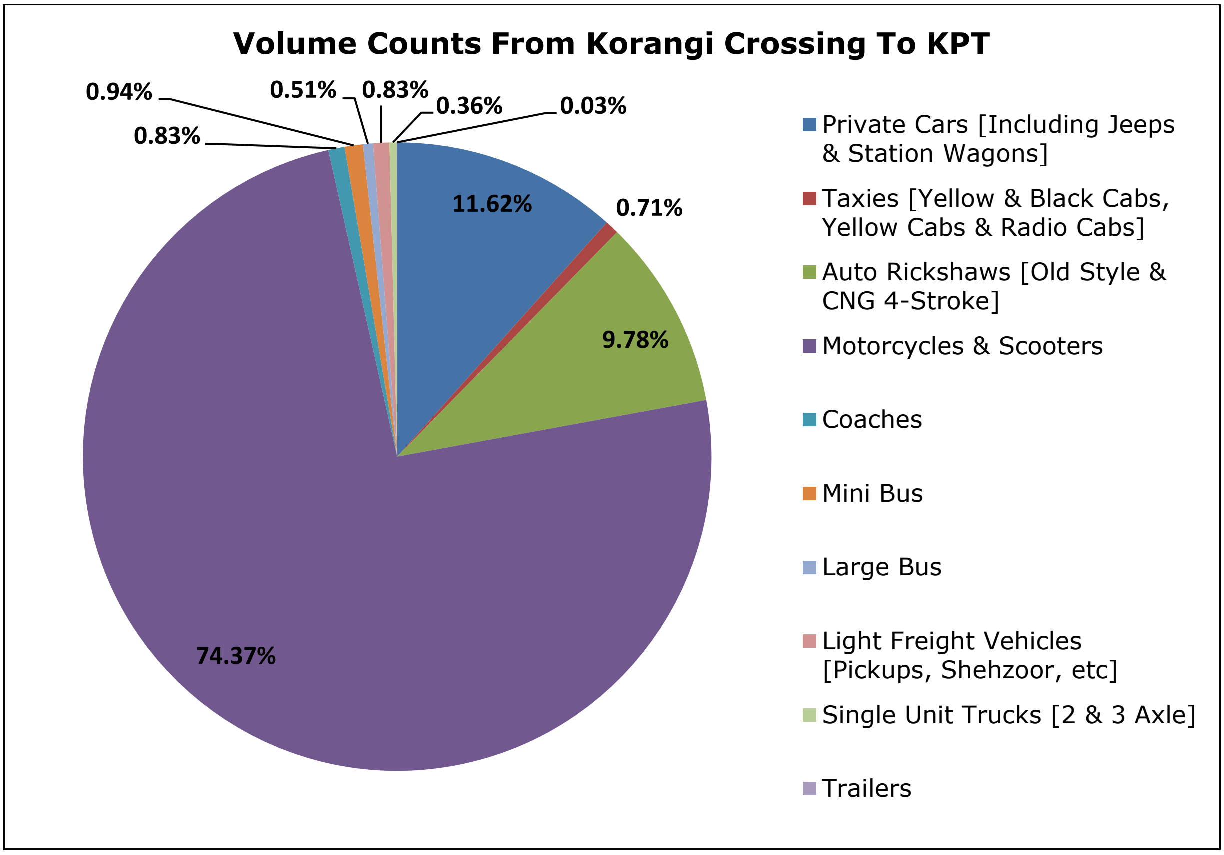


Figure 3.81: Volume Counts from Korangi Crossing to KPT (VC-20)

Motorcycles constitute the largest vehicle share with 75%, followed by Private Cars with 12%. Para Transit share in the total vehicle fleet is high at 11%. Rest of the modal distribution consists of Freight Vehicles is less than 1% and Public Transport have 2.28%.

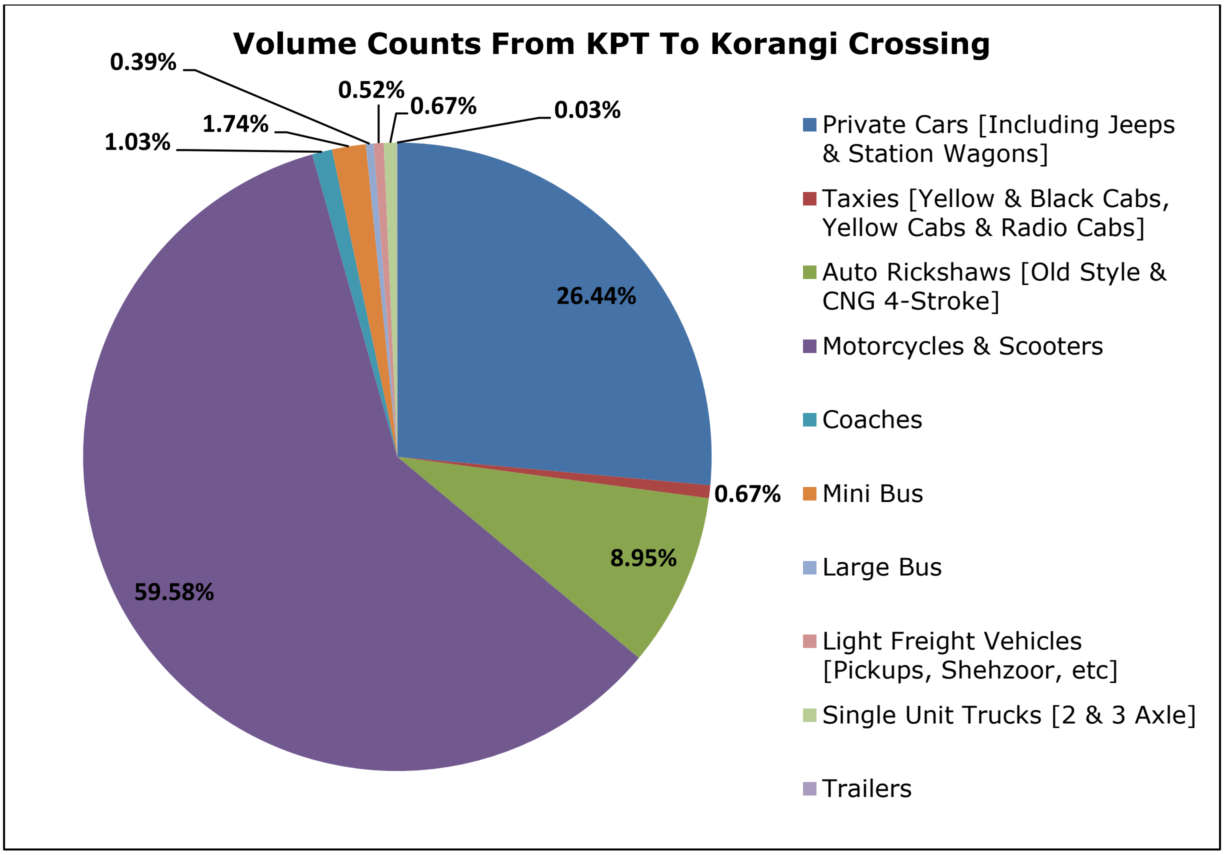


Figure 3.82: Volume Counts from KPT to Korangi Crossing (VC-20)

Motorcycles constitute the largest vehicle share with 59.5%, followed by Private Cars with 26.4%. Para Transit share in the total vehicle fleet is high at 9.62%. Rest of the modal distribution consists of Freight Vehicles is less than 1% and Public Transport have 3.17%.

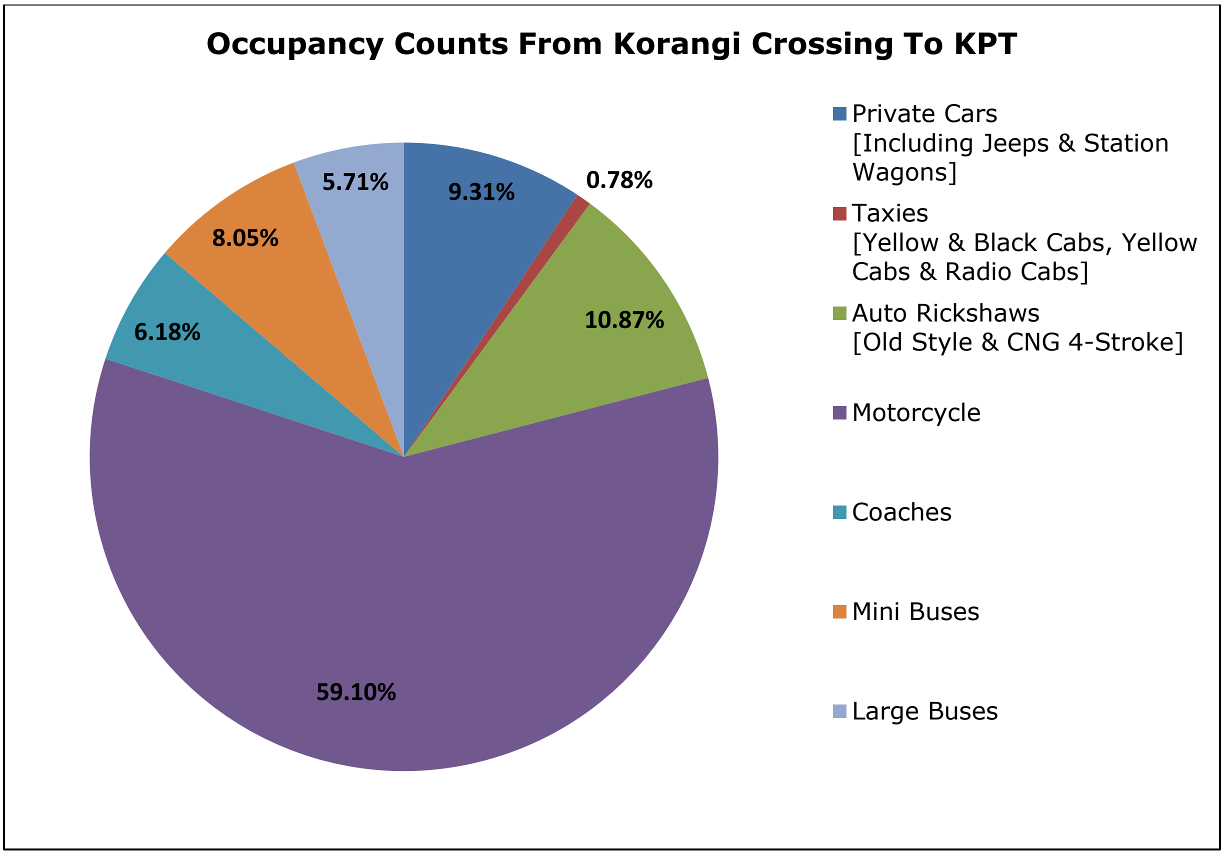


Figure 3.83: Occupancy Counts from Korangi Crossing to KPT (OC-20)

In this area occupancy rate for Motorcycle is very high around 59% passengers counts in single direction from Korangi Crossing to KPT. Public Transport is the second highest which makes 19.94%. Para transit is 12% occupant and Private Cars makes less than 10% share.

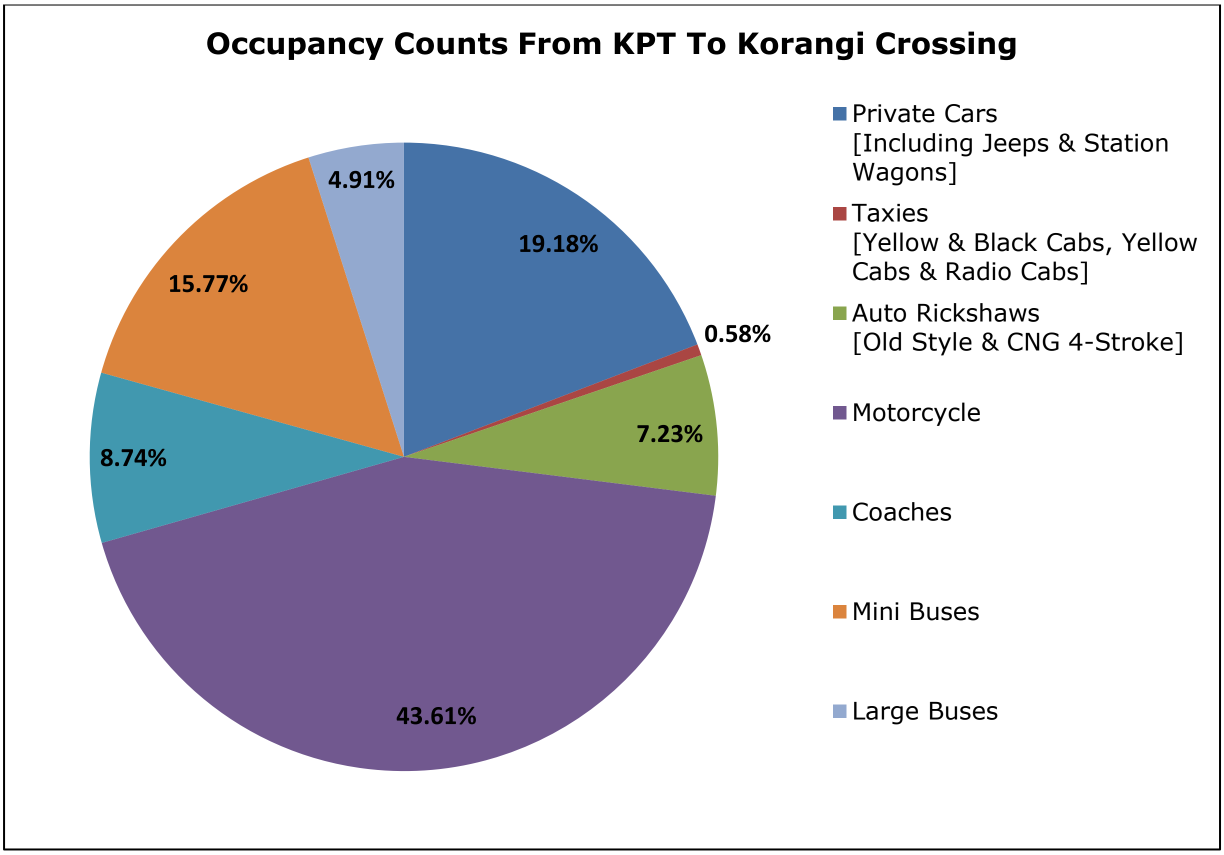


Figure 3.84: Occupancy Counts from KPT to Korangi Crossing (OC-20)

In this area occupancy rate for Motorcycle is very high around 44% passengers counts in single direction from KPT to Korangi Crossing. Public Transport is the second highest which makes 29%. Private Cars is 19% occupant and Para transit makes less than 10% share.

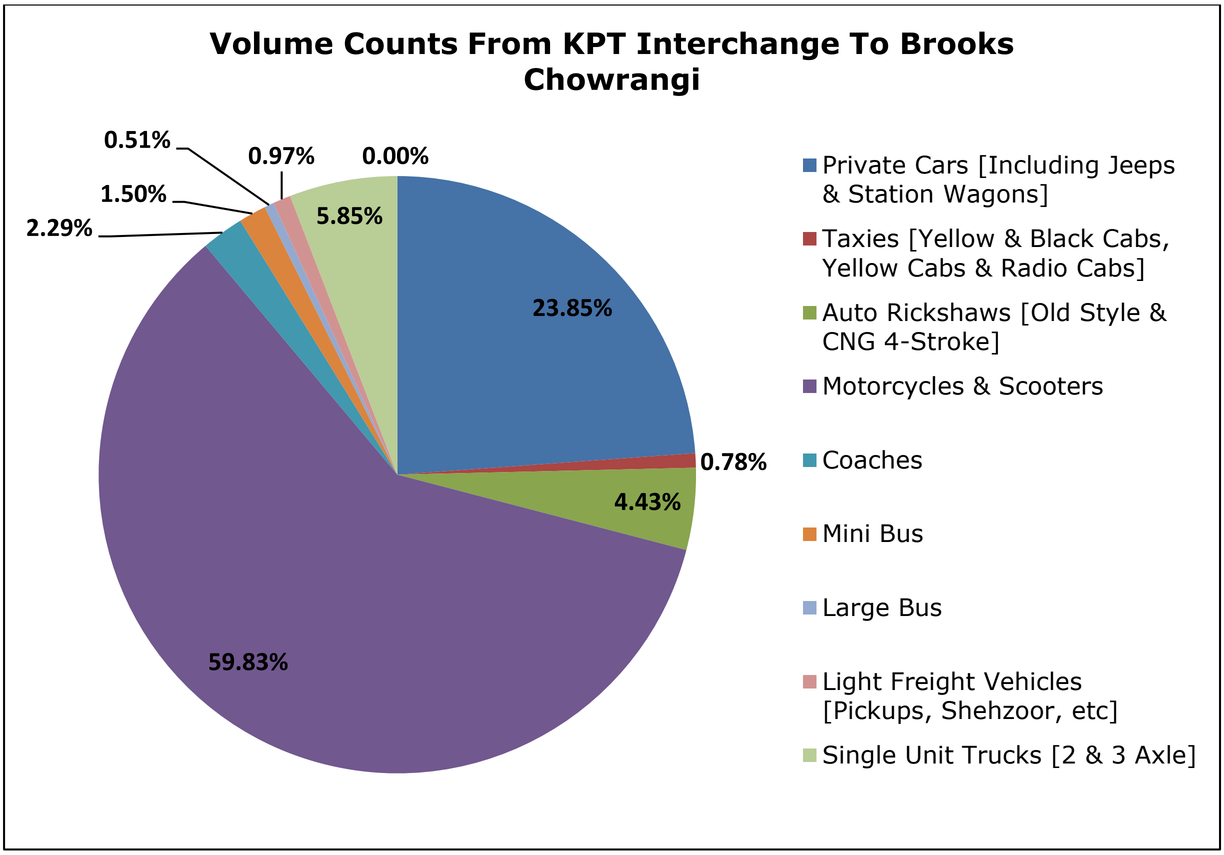


Figure 3.85: Volume Counts from KPT Interchange to Brooks Chowrangi (VC-21)

Private Cars and Motor Cycles are predominant mode of transport even in this segment as they sum up to around 83.68% of the total modal split with 23.85% and 59.83% share respectively. Other major modes in this area are Para transit which constitutes around 5% also Public Transport Consists 4.3% vehicular traffic share and Freight Vehicles are 6.82% of the total modal share.

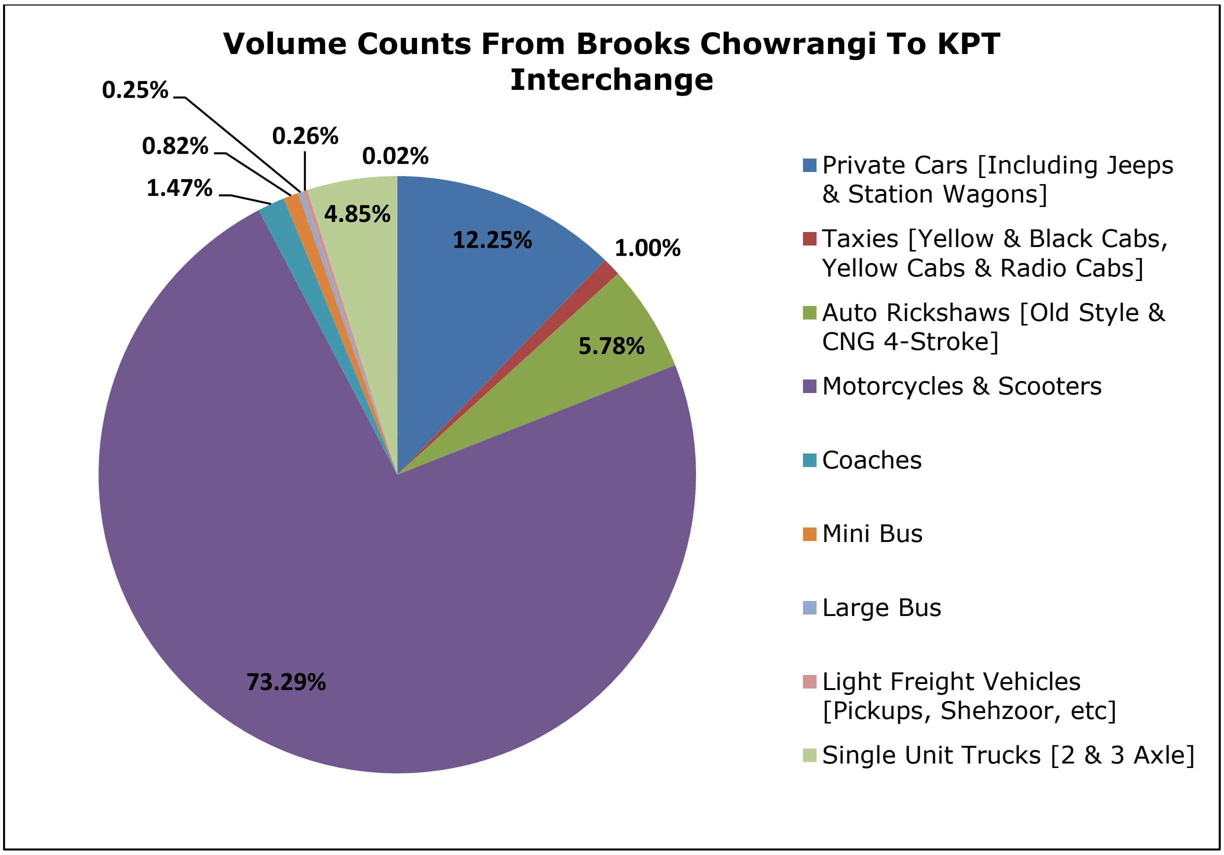


Figure 3.86: Volume Counts from Brooks Chowrangi to KPT Interchange (VC-21)

Private Cars and Motor Cycles are predominant mode of transport even in this segment as they sum up to around 85.54% of the total modal split with 12.25% and 73.29% share respectively. Other major modes in this area are Para transit which constitutes around 7% also Public Transport Consists 3% vehicular traffic share and Freight Vehicles are 5% of the total modal share.

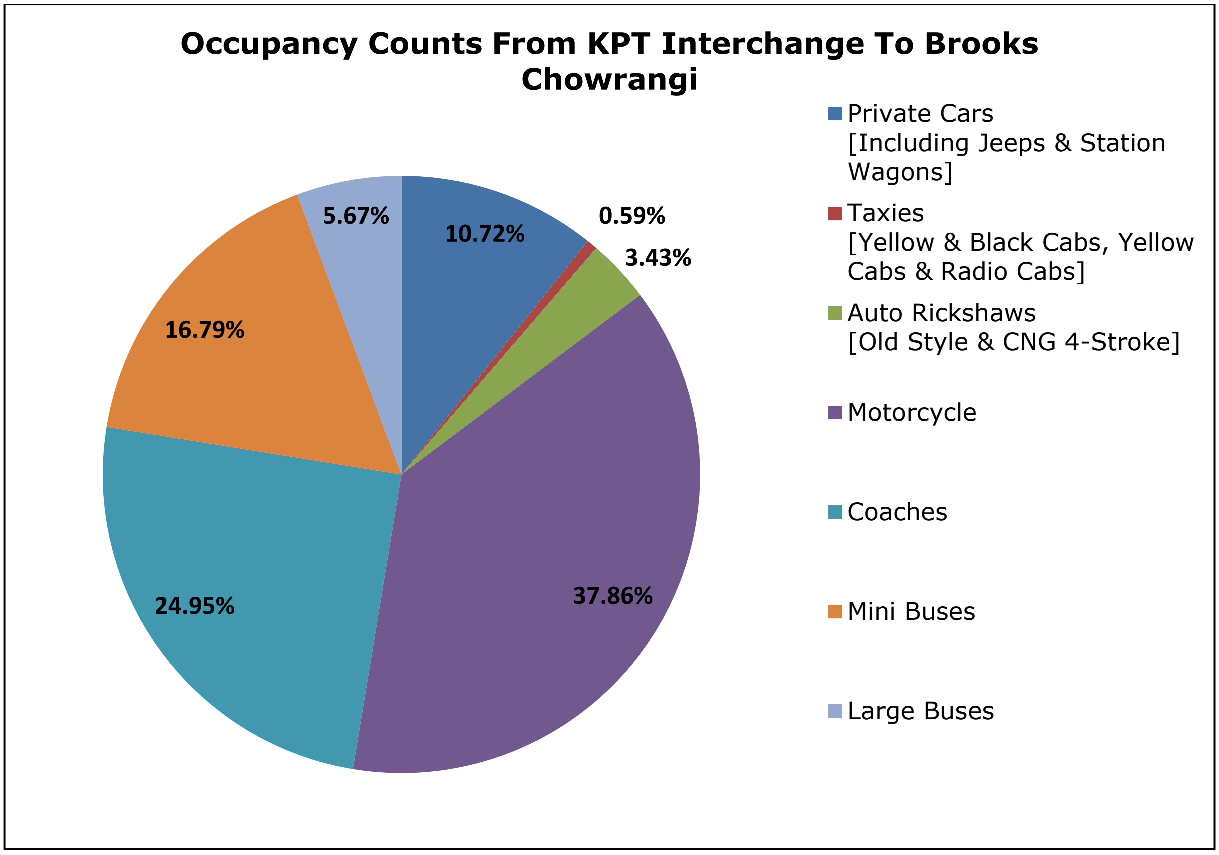


Figure 3.87: Occupancy Counts from KPT Interchange to Brooks Chowrangi (OC-21)

In this area occupancy rate for Public Transport is very high around 47.25% passengers counts in single direction from KPT Interchange to Brooks Chowrangi. Motorcycle is the second highest which makes 37.86%. Private Cars is 10.72% occupant and Para transit makes less than 5% share.

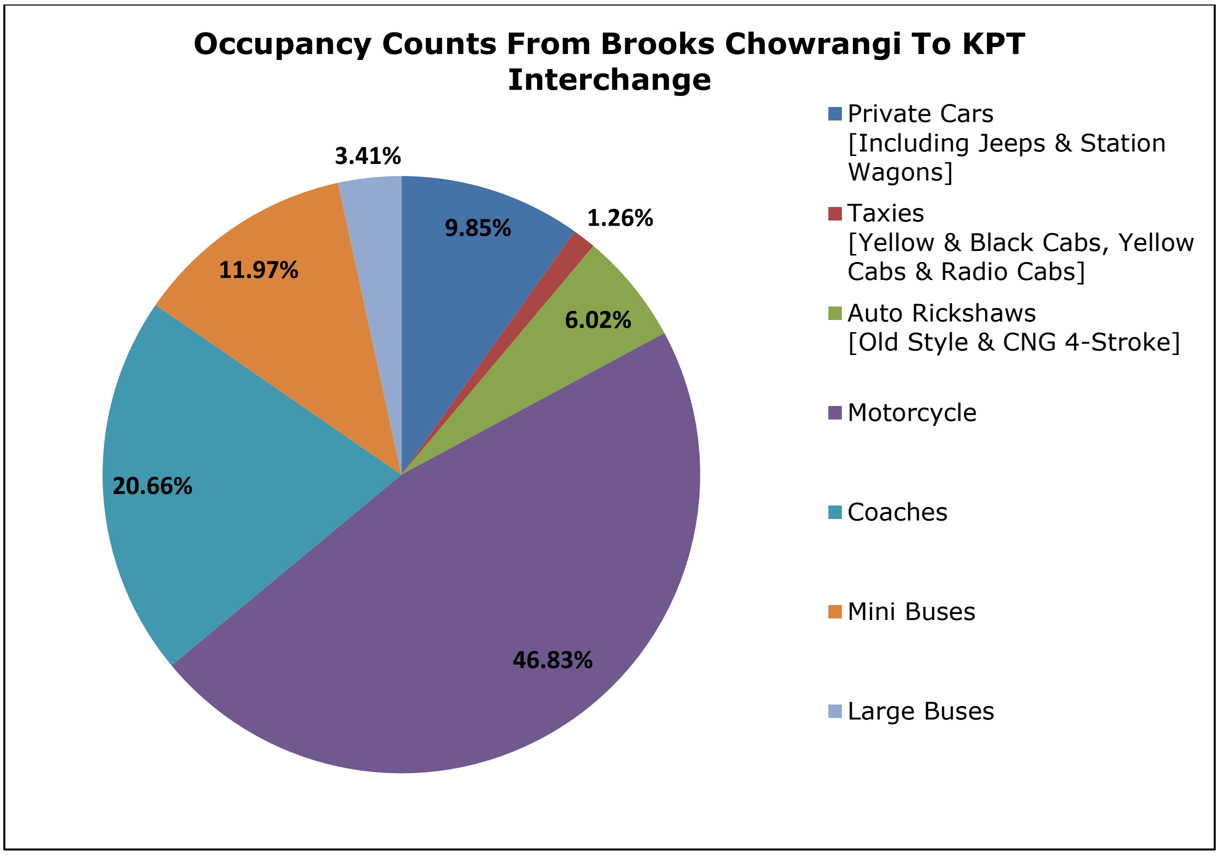


Figure 3.88: Occupancy Counts from Brooks Chowrangi to KPT Interchange (OC-21)

In this area occupancy rate for Motorcycle is very high around 46.8% passengers counts in single direction from Brooks Chowrangi to KPT Interchange. Public Transport is the second highest which makes 35.5%. Private Cars is 10% occupant and Para transit makes less than 8% share.

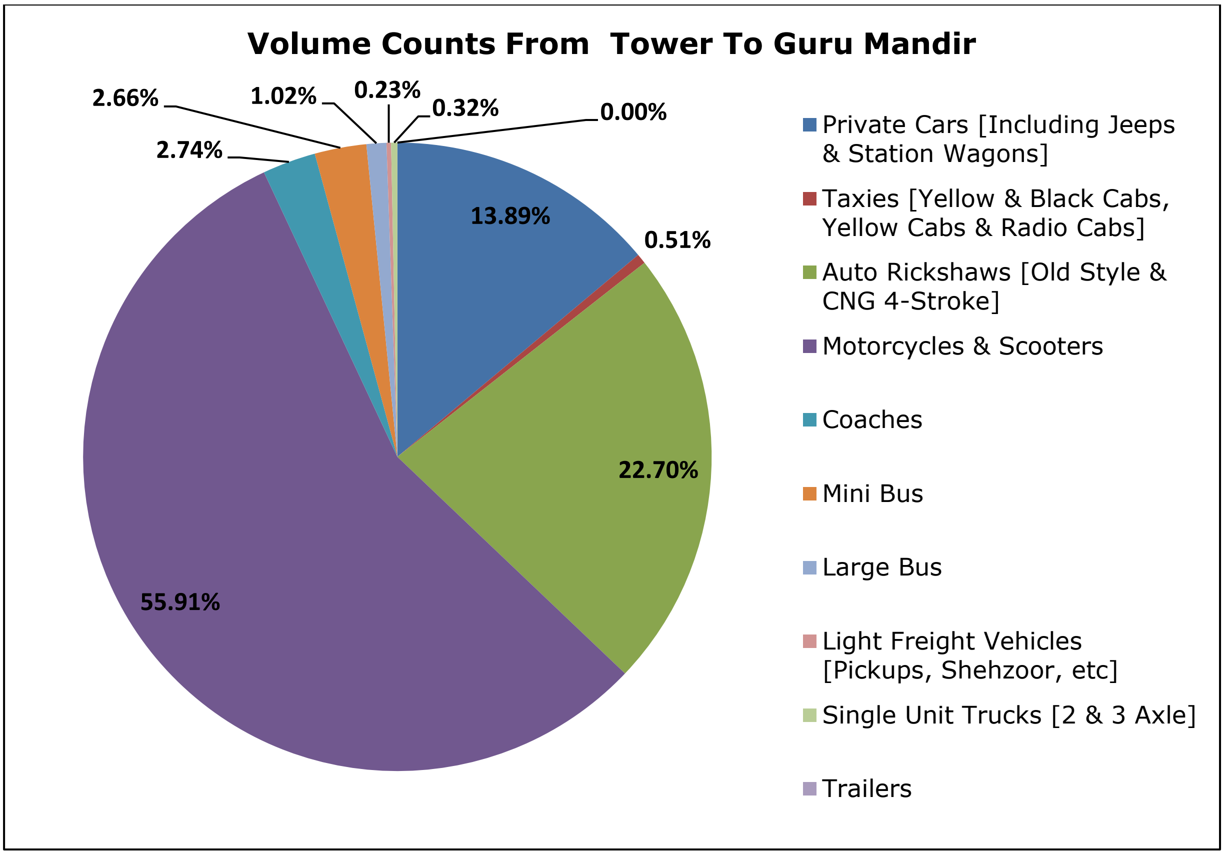


Figure 3.89: Volume Counts from Tower to Guru Mandir (VC-22)

Motorcycles are the most predominant mode of transport in the entire area. Private Cars have consisted of 14% mode share. Public Transport (all types included) only makes 6.42% of vehicular mix which clearly suggests the depriving trend of Public Transport availability for the residents of Karachi. Para Transit including Taxi and Rickshaws makes share around 24% of the total vehicular share. Freight Traffic constitutes 1% of the total vehicular mix.

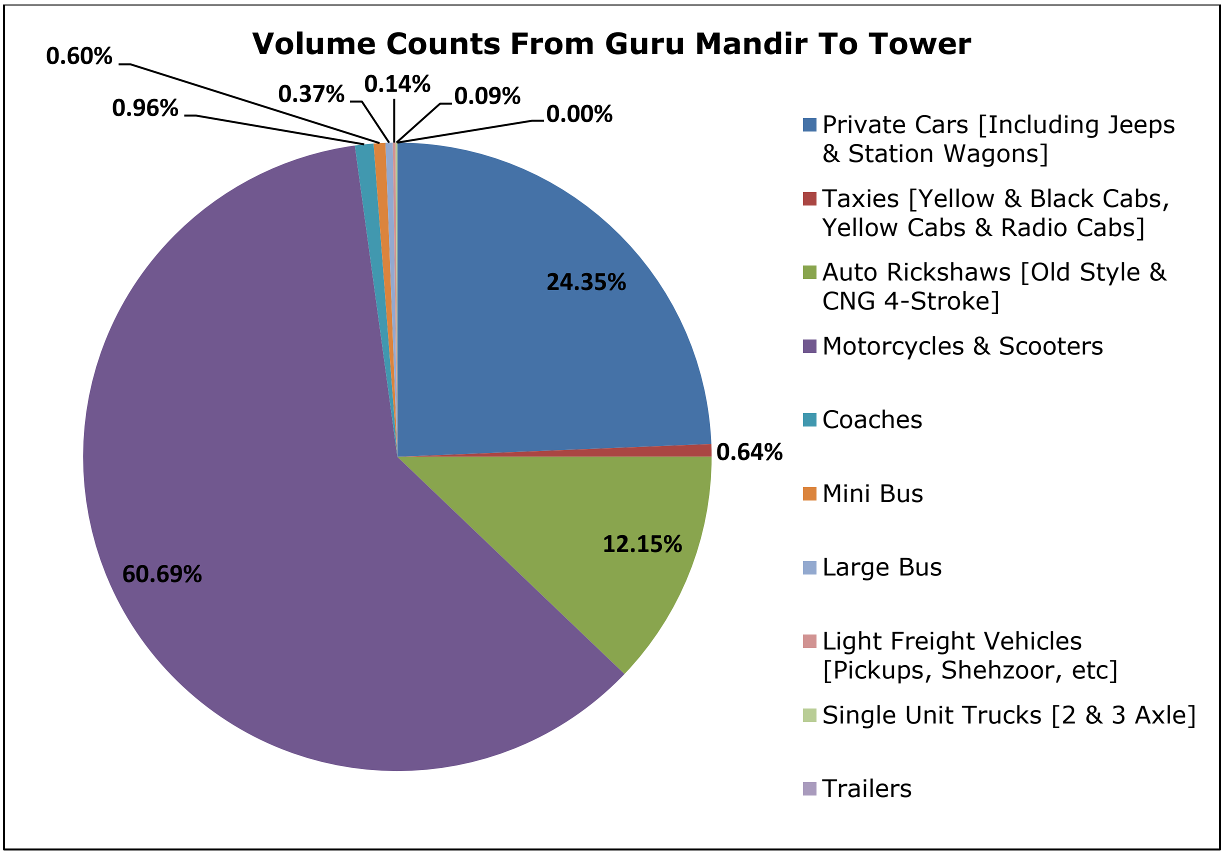


Figure 3.90: Volume Counts from Guru Mandir to Tower (VC-22)

Motorcycles are the most predominant mode of transport in the entire area. Private Cars have consisted of 24% mode share. Public Transport (all types included) only makes 2% of vehicular mix which clearly suggests the depriving trend of Public Transport availability for the residents of Karachi. Para Transit including Taxi and Rickshaws makes share around 13% of the total vehicular share. Freight Traffic constitutes less than 1% of the total vehicular mix.

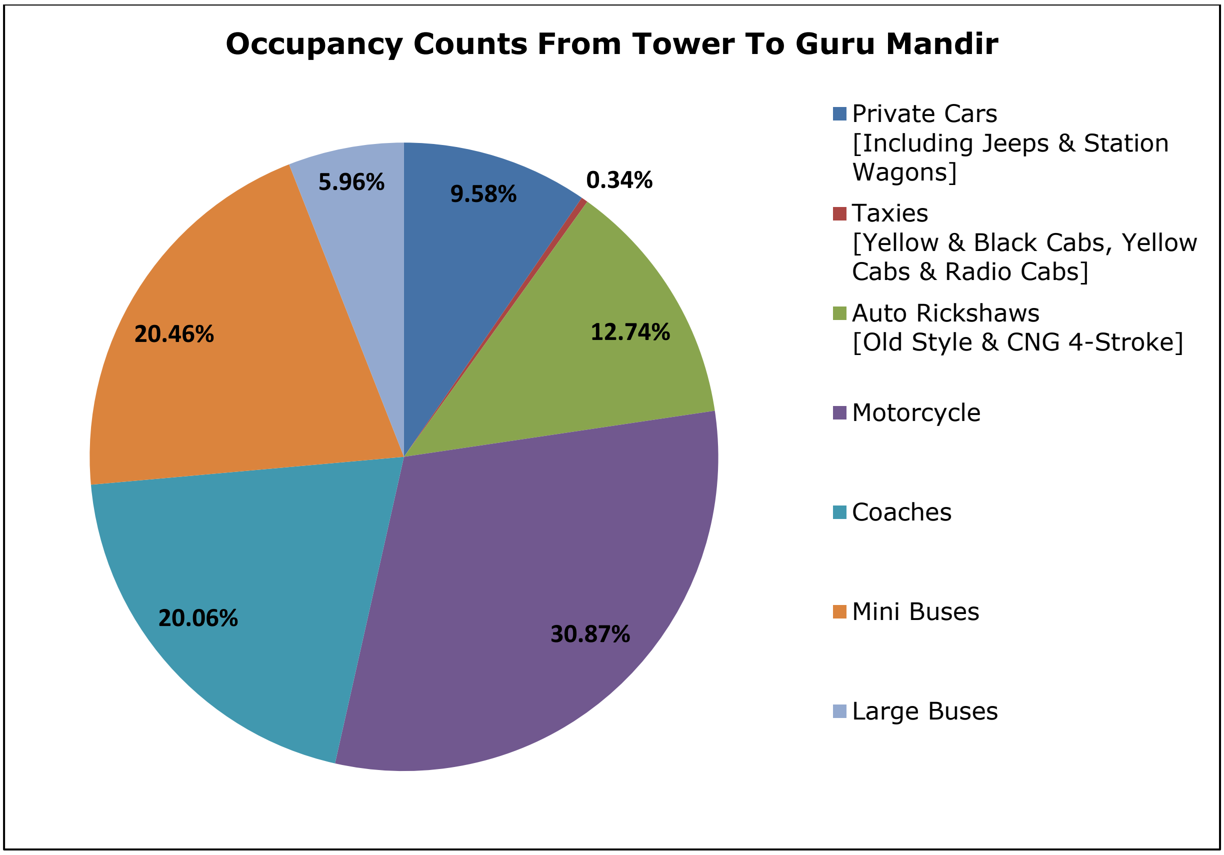


Figure 3.91: Occupancy Counts from Tower to Guru Mandir (OC-22)

In this area occupancy rate for Public Transport is very high around 46% passengers counts in single direction from Tower to Guru Mandir. Motorcycle is the second highest which makes 31%. Para transit are 14% occupant and Private Cars makes 10% share.

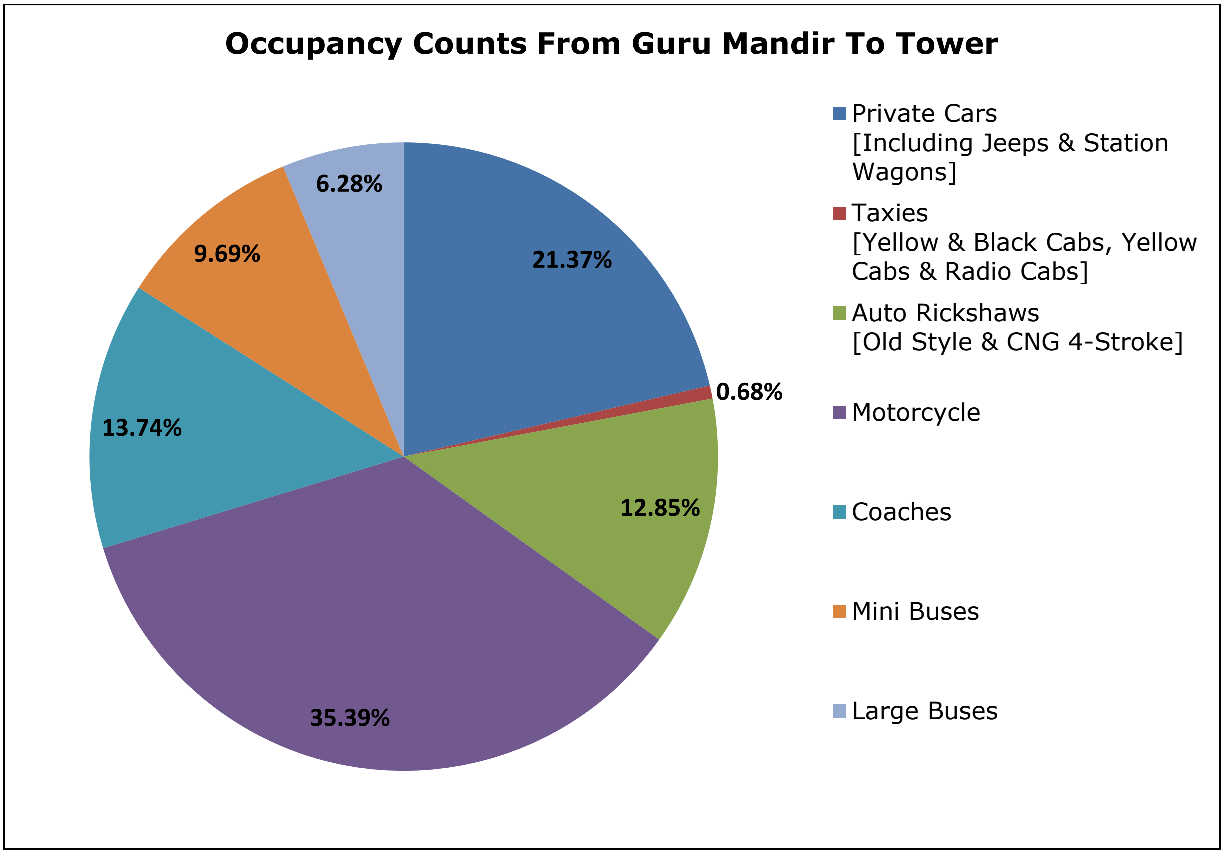


Figure 3.92: Occupancy Counts from Guru Mandir to Tower (OC-22)

In this area occupancy rate for Motorcycle is very high around 36% passengers counts in single direction from Guru Mandir to Tower. Public Transport is the second highest which makes 29%. Para transit are 14% occupant and Private Cars makes 21% share.

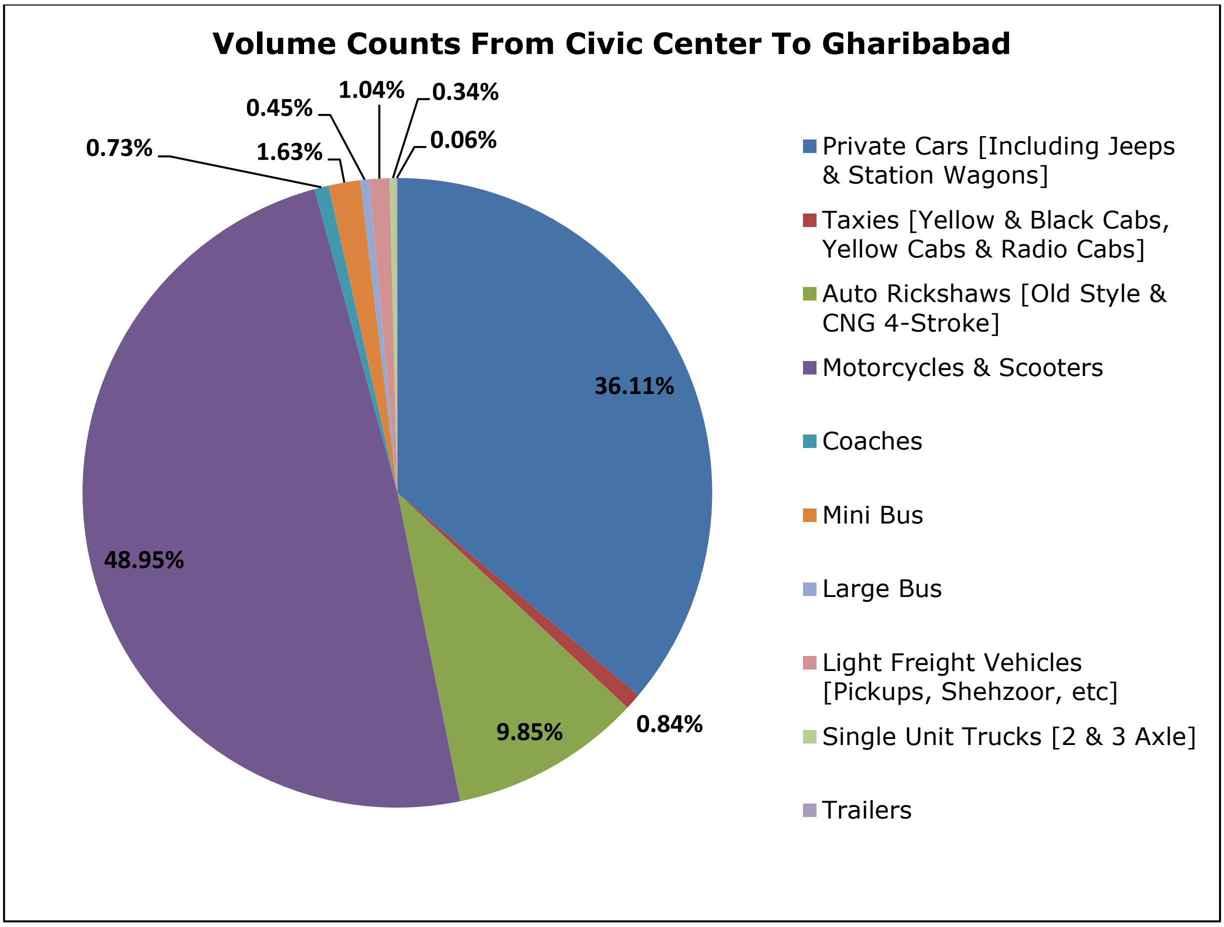


Figure 3.93: Volume Counts from Civic Center to Gharibabad (VC-23)

Motor cycles constitutes the highest percentage of modal share which is 49% of the total and if cars be included which is 36% it makes more than three quarter of the total modal split which clearly suggests that the private vehicle dependency is very high. Auto Rickshaw constitutes around 9.85% of the vehicular mix and taxies are very low in numbers that is 1% and all Public Transport adding up will only be 4%, similarly Freight Transport have less than 2% share at this particular location.

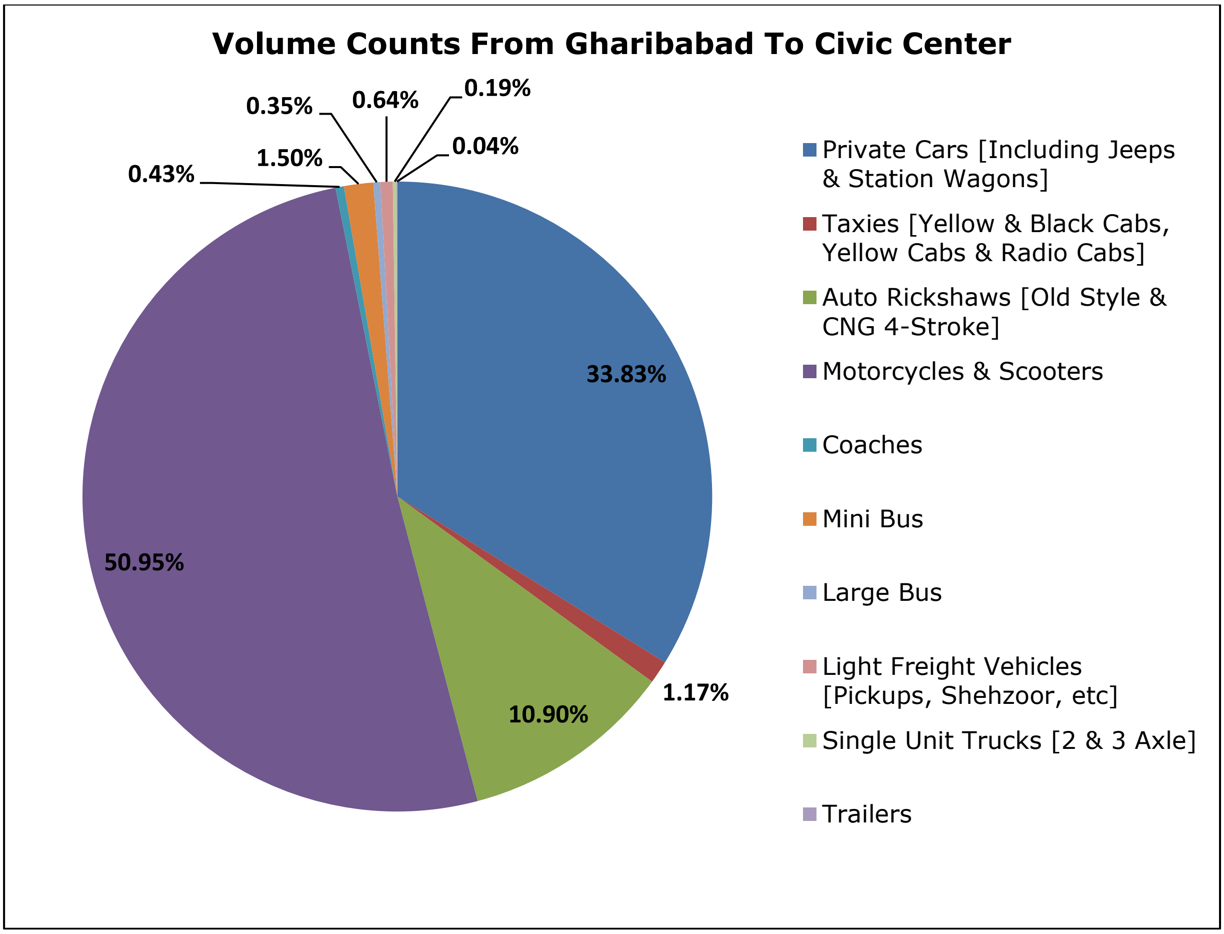


Figure 3.94: Volume Counts from Gharibabad to Civic Center (VC-23)

Motor cycles constitutes the highest percentage of modal share which is 51% of the total and if cars be included which is 34% it makes more than three quarter of the total modal split which clearly suggests that the private vehicle dependency is very high. Auto Rickshaw constitutes around 10.90% of the vehicular mix and taxies are very low in numbers that is 2% and all Public Transport adding up will only be 3%, similarly Freight Transport have less than 2% share at this particular location.

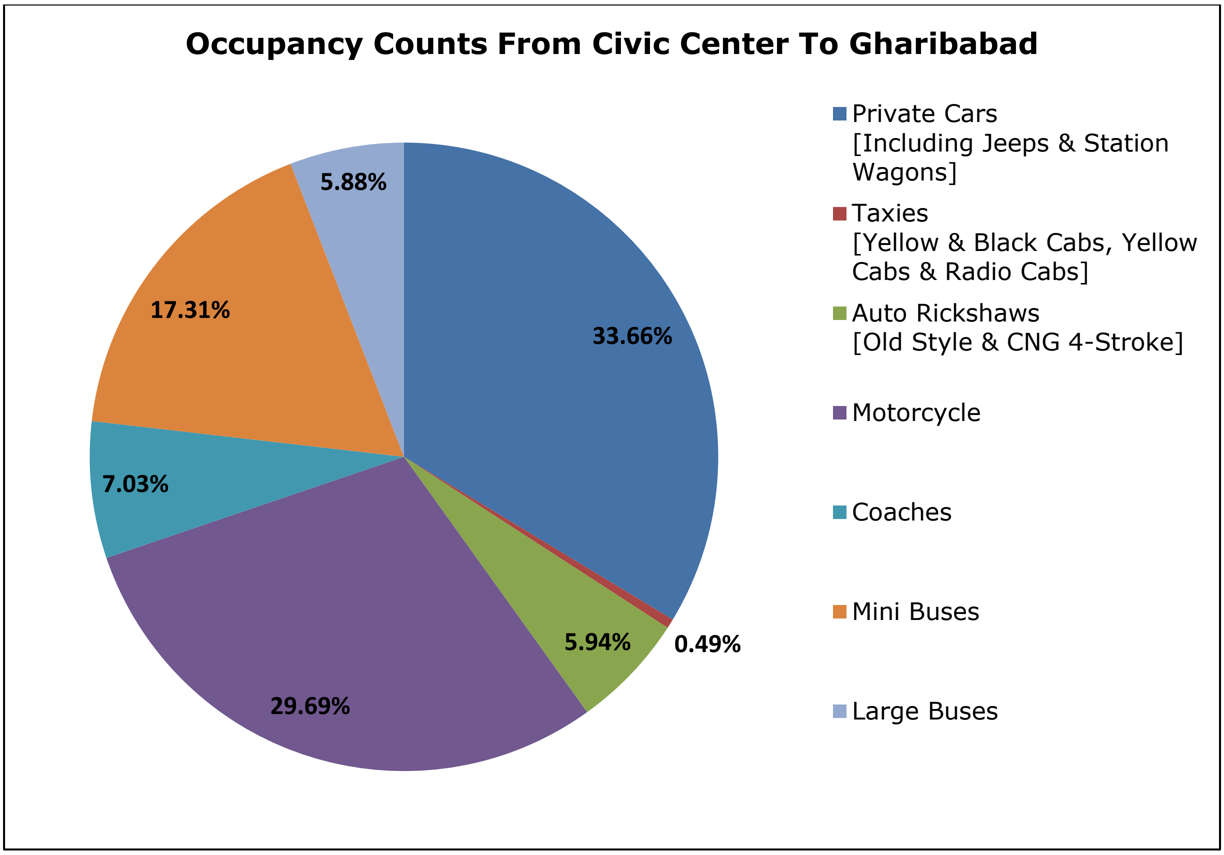


Figure 3.95: Occupancy Counts from Civic Center to Gharibabad (OC-23)

In this area occupancy rate for Private car is very high around 34% passengers counts in single direction from Civic Center to Gharibabad. Public Transport are the second highest which makes 30%. Motorcycles are 29% occupant and Para transit makes 7% share.

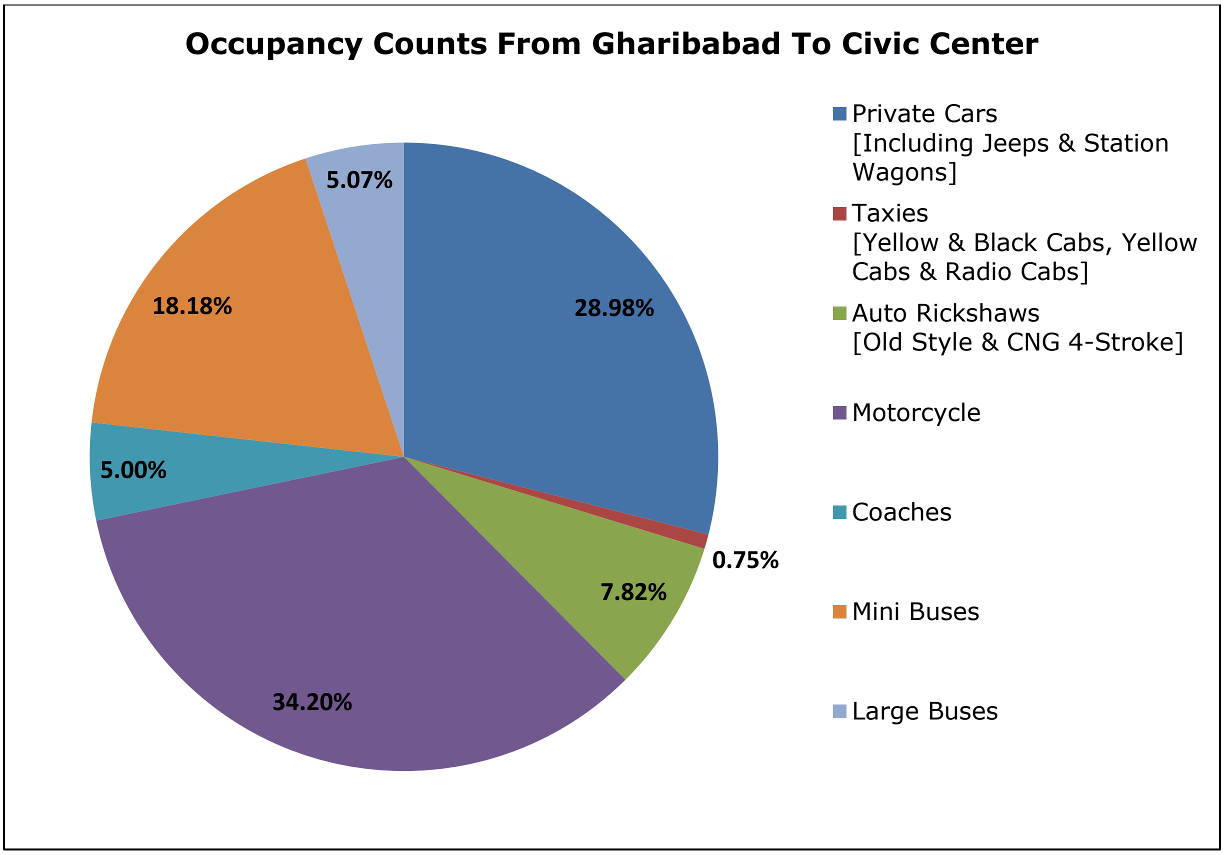


Figure 3.96: Occupancy Counts from Gharibabad to Civic Center (OC-23)

In this area occupancy rate for Motorcycles is very high around 34% passengers counts in single direction from Gharibabad to Civic Center. School. Private cars are the second highest which makes 29%. Public Transport is 28% occupant and Para transit makes 9% share.

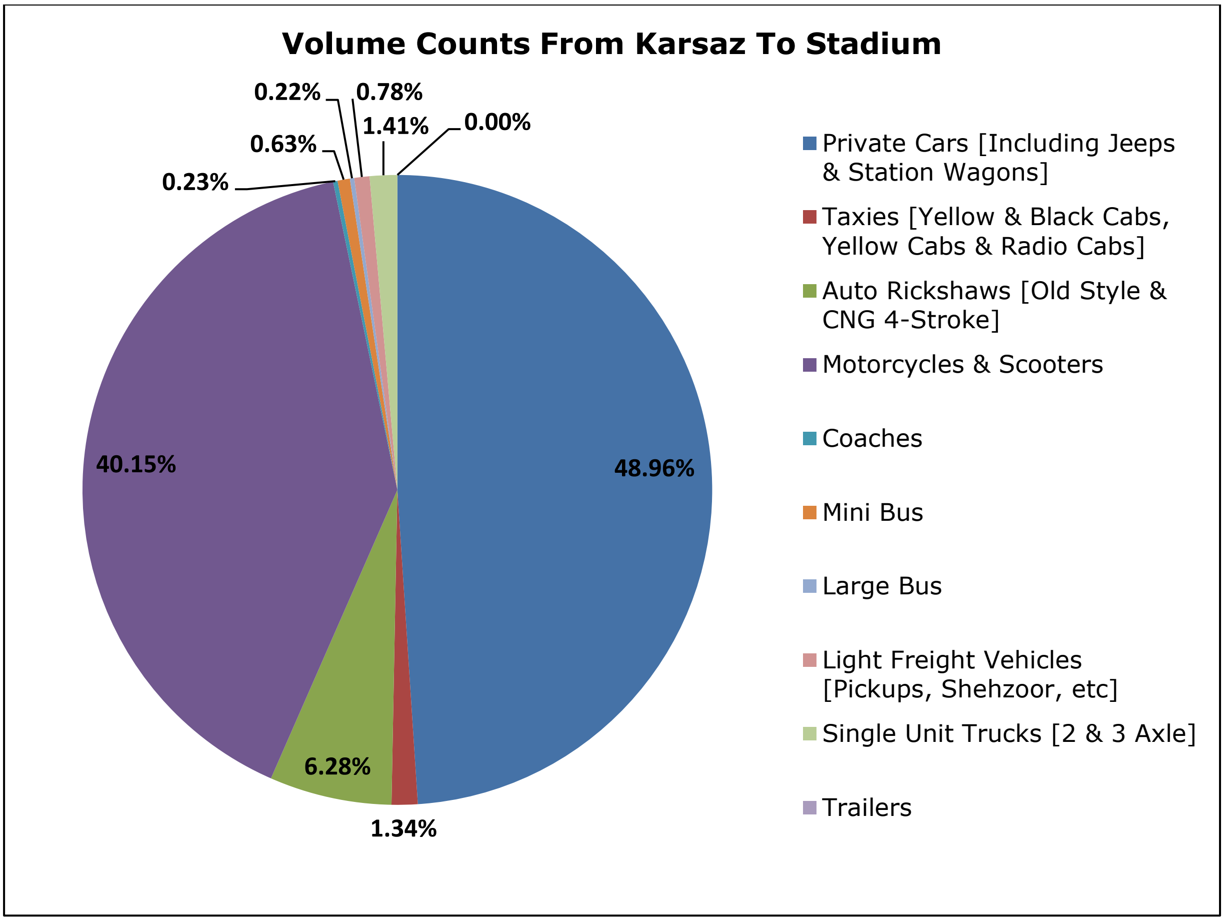


Figure 3.97: Volume Counts from Karsaz to Stadium (VC-24)

Private Cars are the most predominant mode of transport in the entire area. Motorcycles are the second highest which makes around 40.15%. Para Transit including Taxi and Rickshaws makes around 7% of the total vehicular share. Freight Traffic and Public Transport makes less than 5% of vehicular mix.

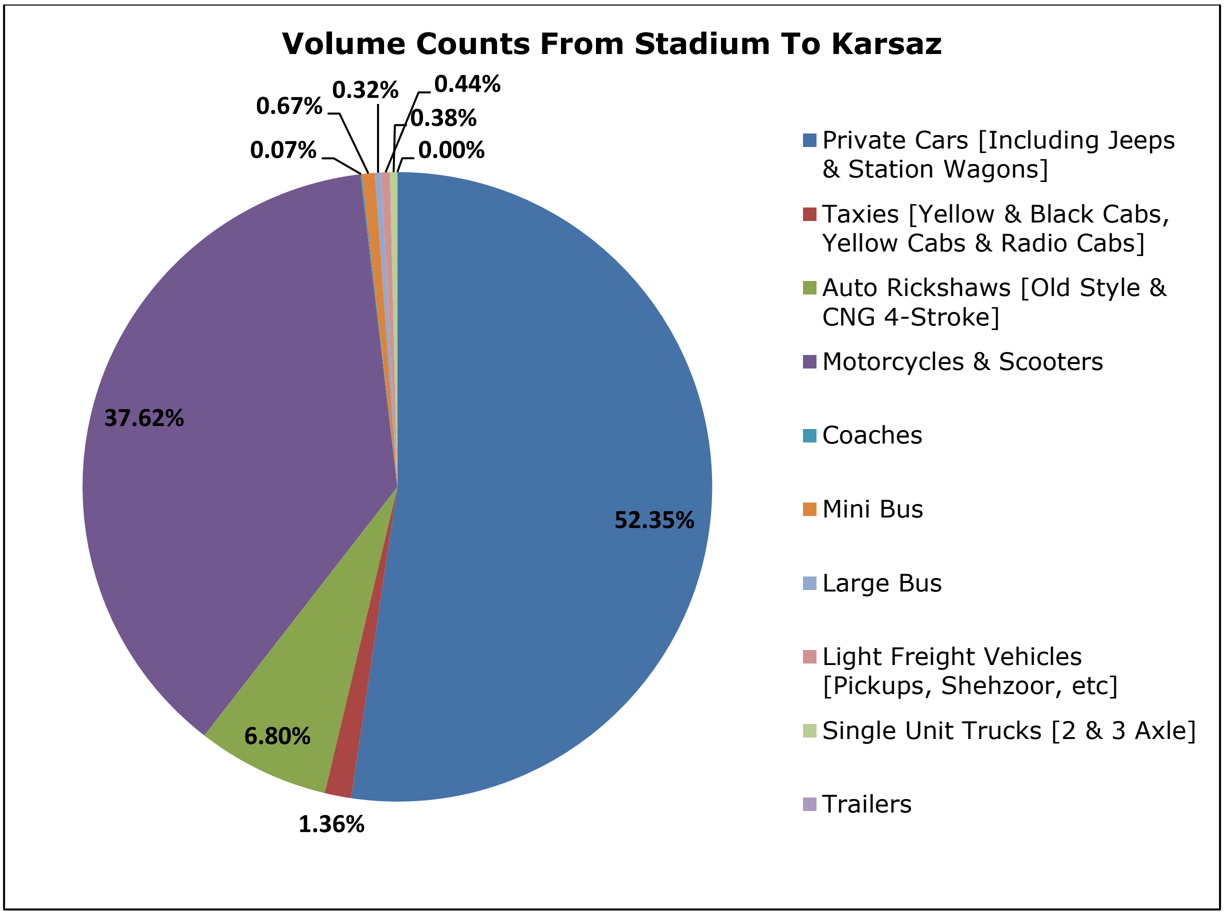


Figure 3.98: Volume Counts from Stadium to Karsaz (VC-24)

Private Cars are the most predominant mode of transport in the entire area. Motorcycles are the second highest which makes around 37.6%. Para Transit including Taxi and Rickshaws makes around 8% of the total vehicular share. Freight Traffic and Public Transport makes less than 3% of vehicular mix.

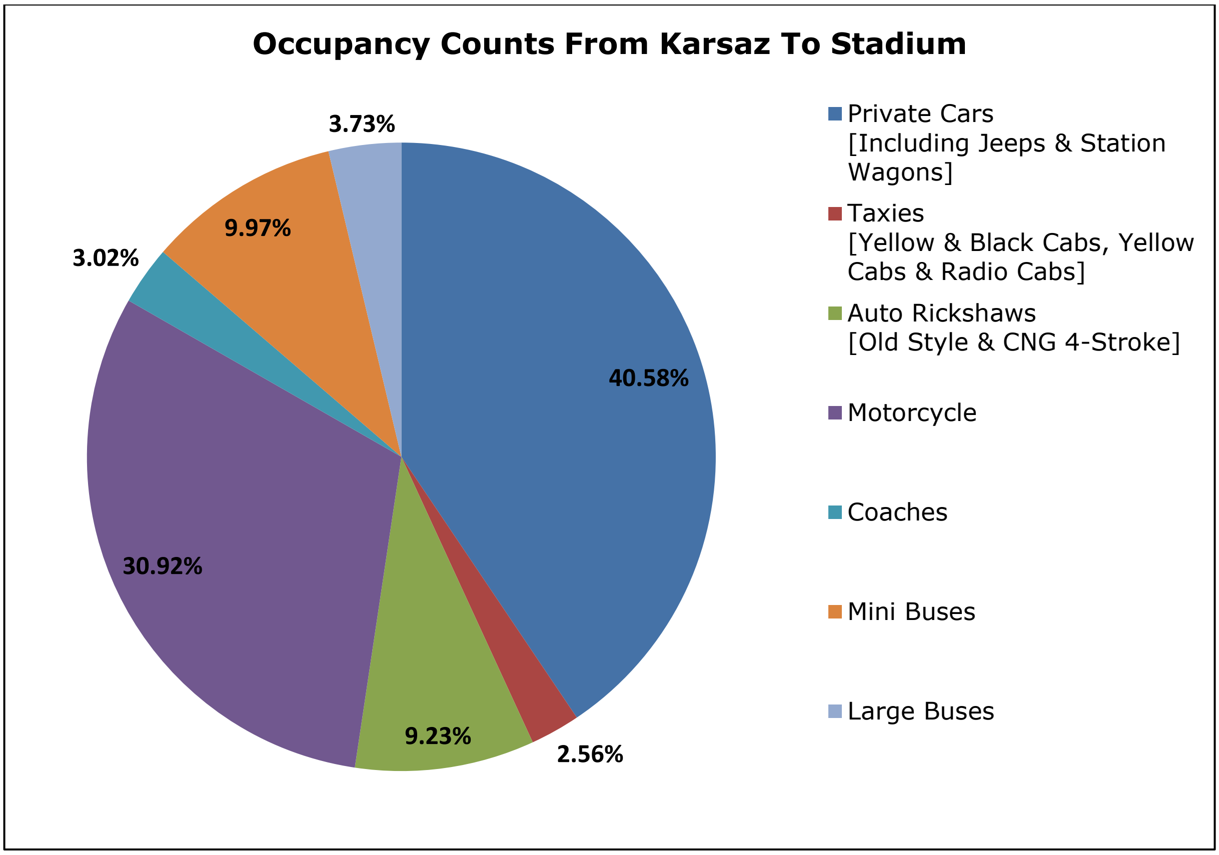


Figure 3.99: Occupancy Counts from Karsaz to Stadium (OC-24)

In this area occupancy rate for Private cars is very high around 40.5% passengers counts in single direction from Karsaz to Stadium. Motorcycles are the second highest which makes 30.92%. Public Transport is 16.6% occupant and Para transit makes 11.79% share.

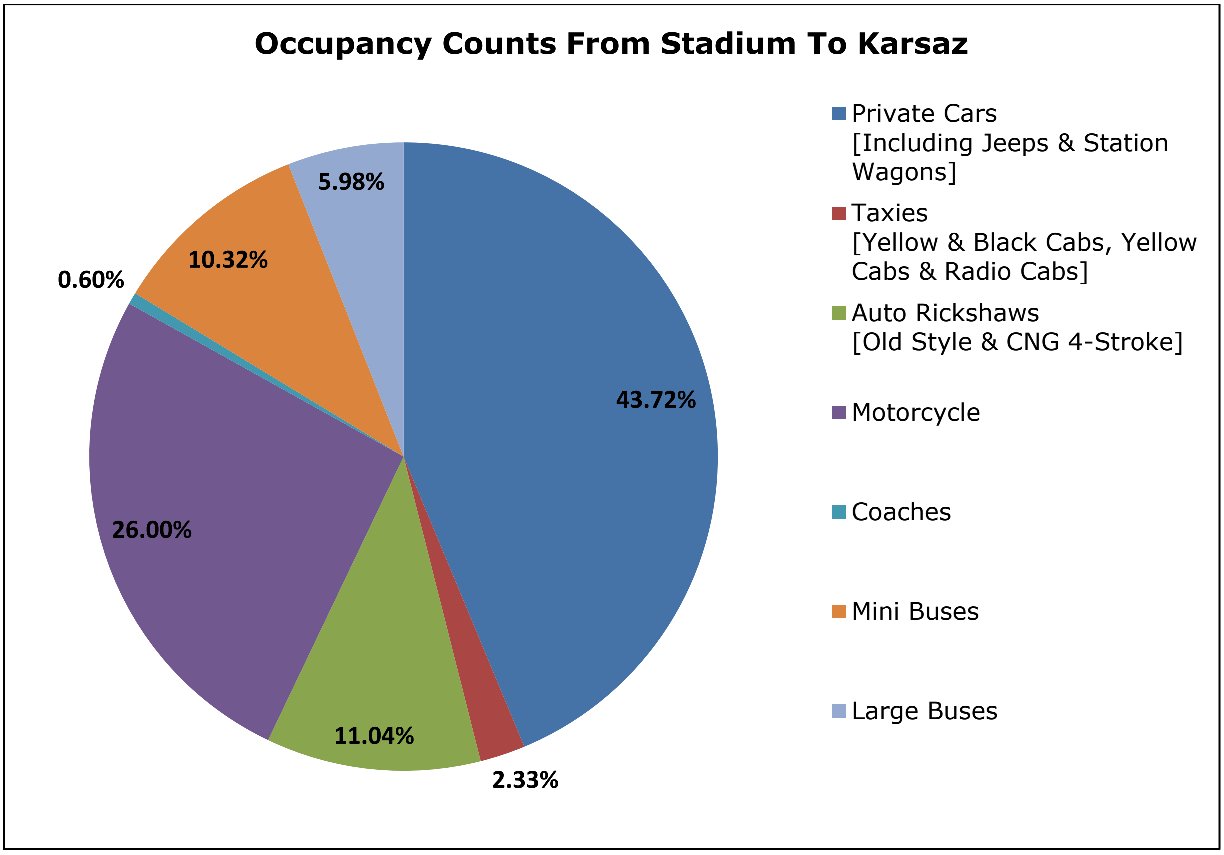


Figure 3.100: Occupancy Counts from Stadium to Karsaz (OC-24)

In this area occupancy rate for Private cars is very high around 43.7% passengers counts in single direction from Stadium to Karsaz. Motorcycles are the second highest which makes 26%. Public Transport is 16.82% occupant and Para transit makes 13% share.

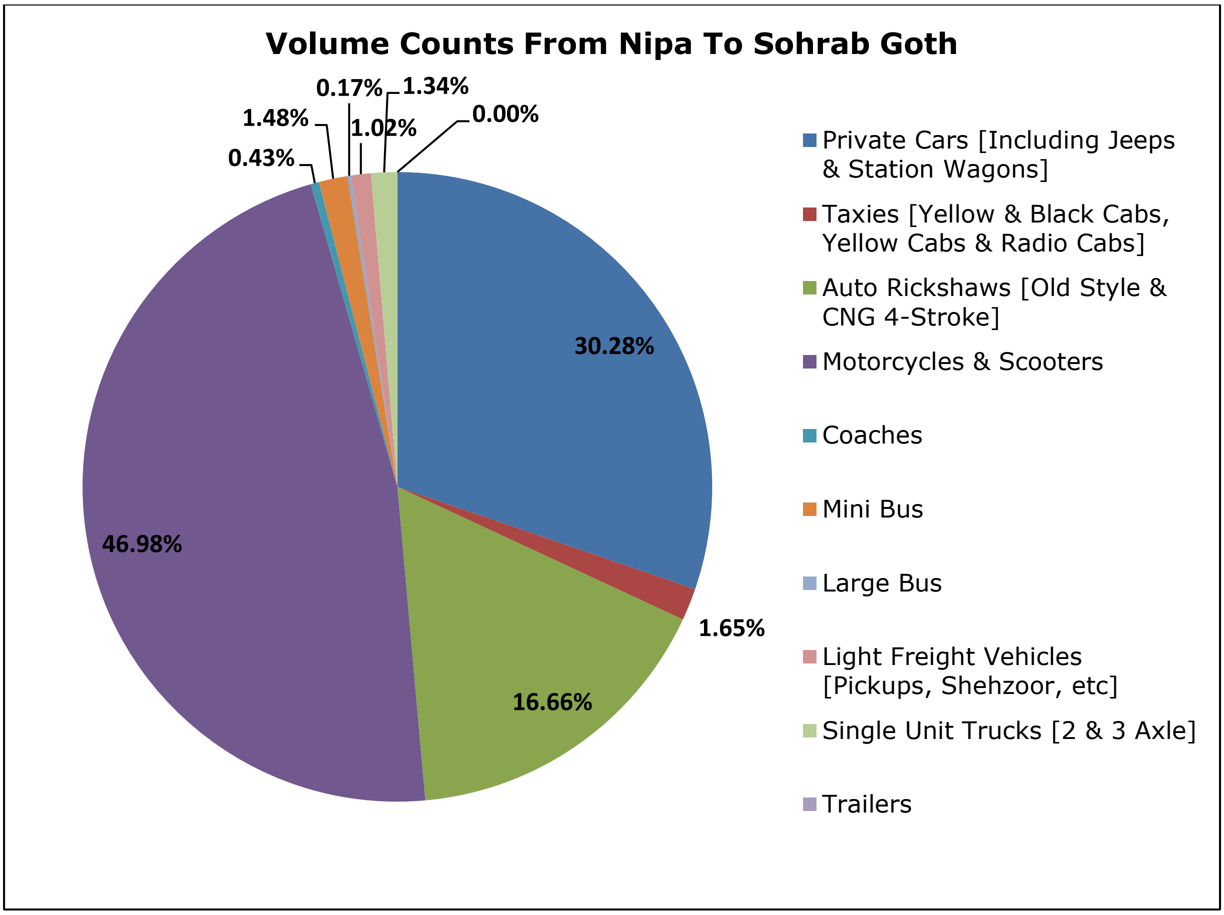


Figure 3.101: Volume Counts from Nipa to Sohrab Goth (VC-25)

Motorcycles constitute the largest vehicle share with 46.98%, followed by Private Cars with 30.28%. Para transit share in the total vehicle fleet is high at 18.31%. Rest of the modal distribution consists of Freight Vehicles is 2.08% and Public Transport is 2.36%.

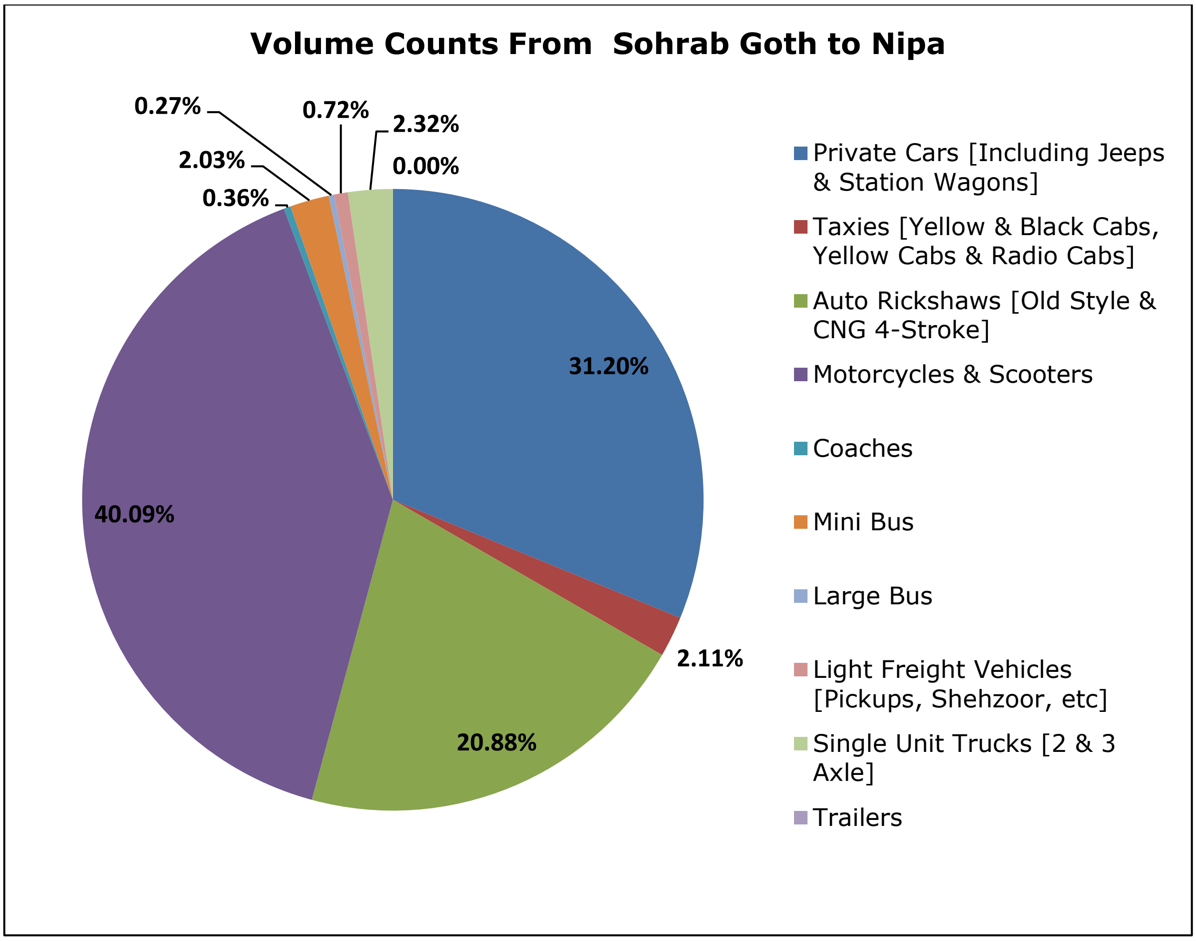


Figure 3.102: Volume Counts from Sohrab Goth to Nipa (VC-25)

Motorcycles constitute the largest vehicle share with 40.09%, followed by Private Cars with 31.20%. Para transit share in the total vehicle fleet is high at 23%. Rest of the modal distribution consists of Freight Vehicles is 3% and Public Transport is 2.66%.

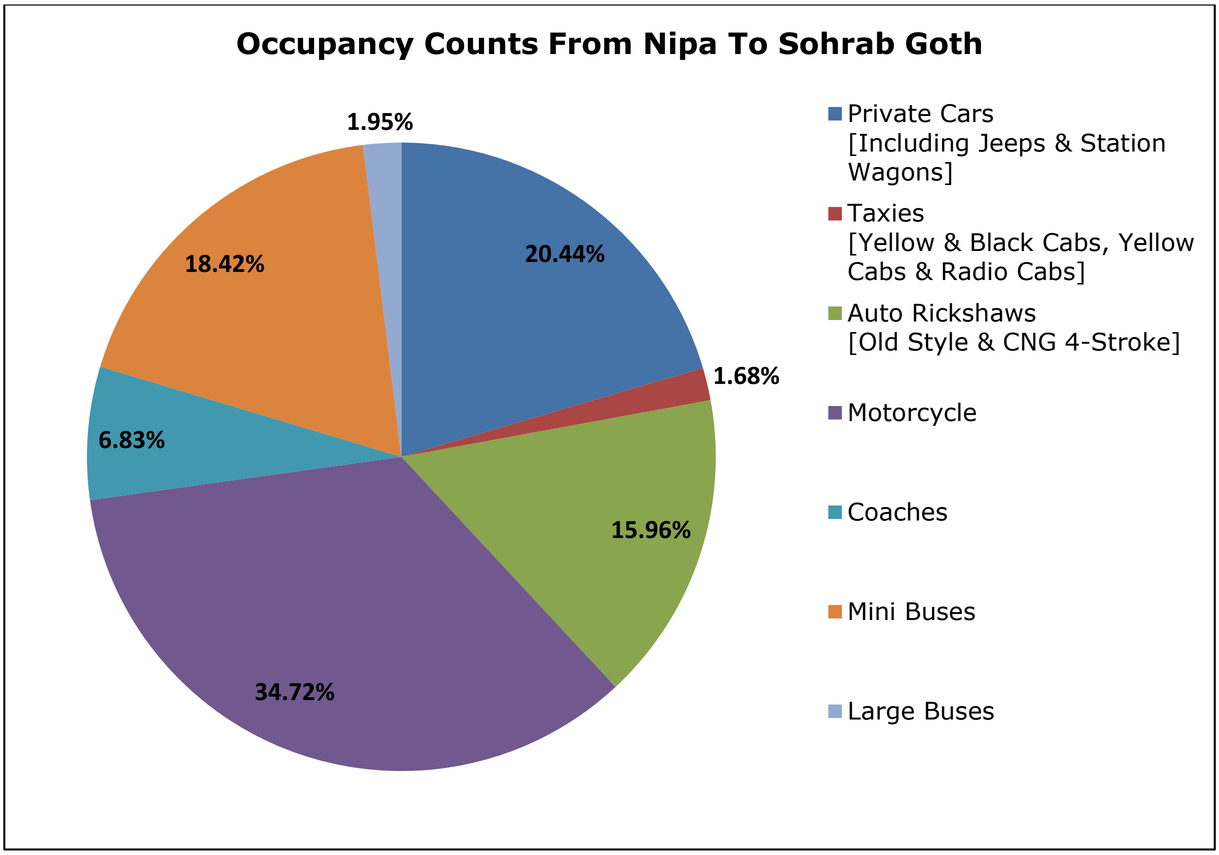


Figure 3.103: Occupancy Counts from Nipa to Sohrab Goth (OC-25)

In this area occupancy rate for Motorcycles is very high around 34.7% passengers counts in single direction from Nipa to Sohrab Goth. Public Transport are the second highest which makes 27.15%. Private cars are 20.4% occupant and Para transit makes 17.58% share.

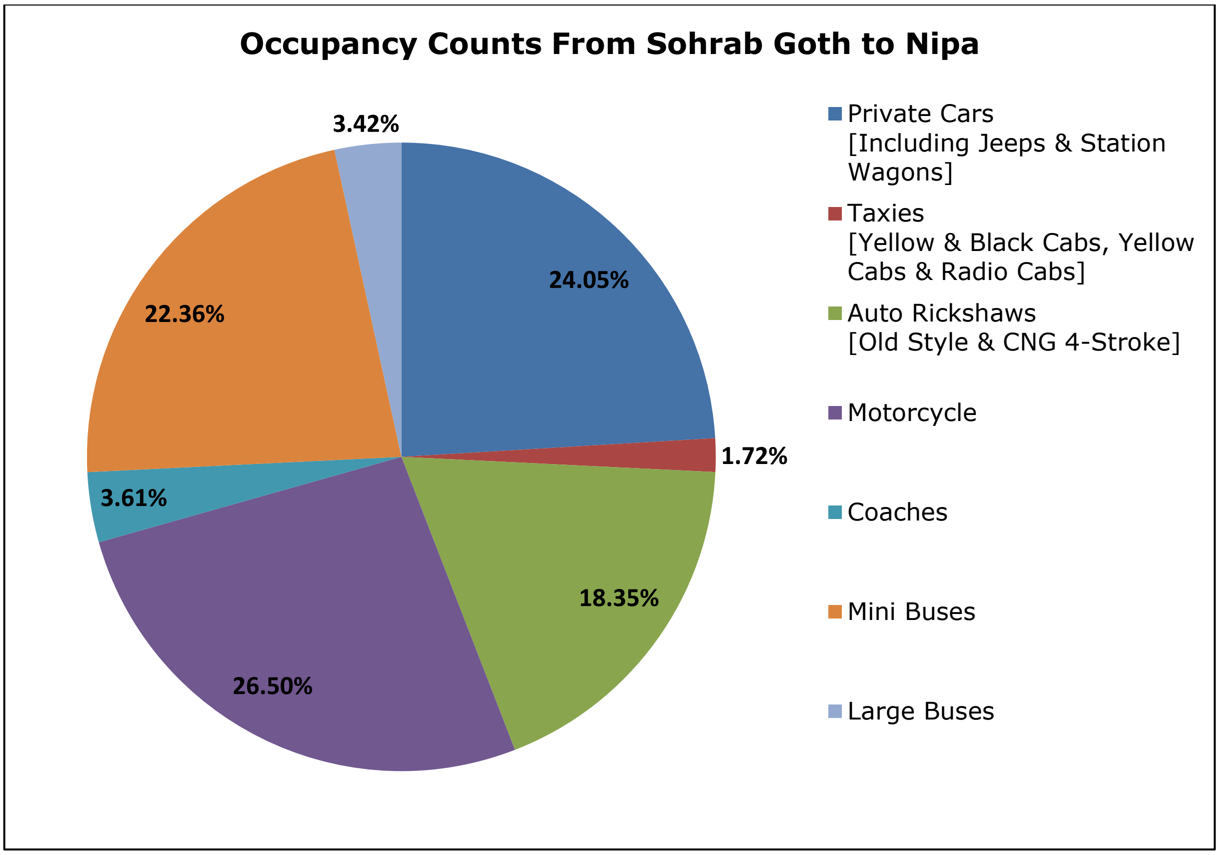


Figure 3.104: Occupancy Counts from Sohrab Goth to Nipa (OC-25)

In this area occupancy rate for Public Transport is very high around 29.38% passengers counts in single direction from Sohrab Goth to Nipa. Motorcycles are the second highest which makes 26.50%. Private cars are 24.05% occupant and Para transit makes 20.07% share.

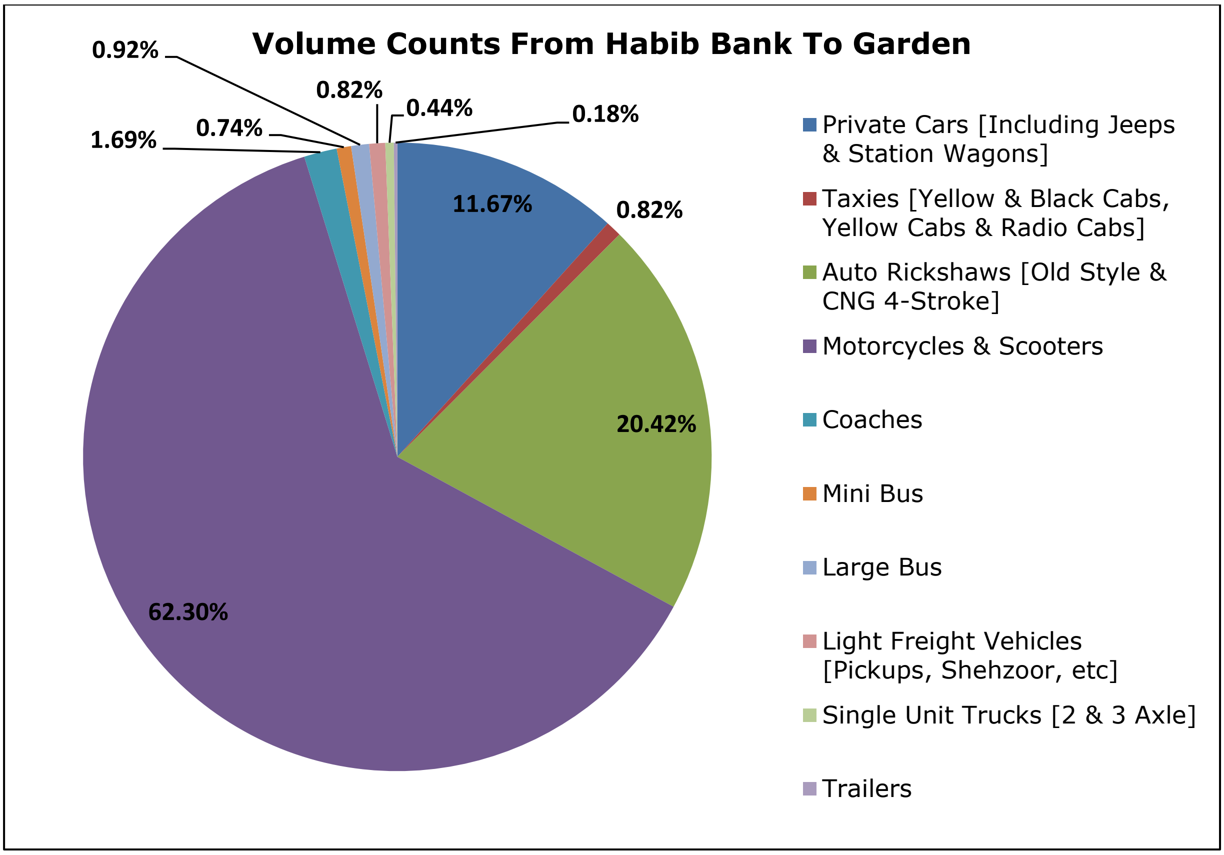


Figure 3.105: Volume Counts from Habib Bank to Garden (VC-26)

Motorcycles in high number at this location which constitutes around 62.03% and Private Cars has 11.67% vehicular traffic share. Para transit Includes Taxies and Rickshaws has second highest modal share with 21.24%. Out of other modal classifications, Public Transport have 3.35% share in terms of modal split and Freight vehicles have less value that is 1.44% modal share.

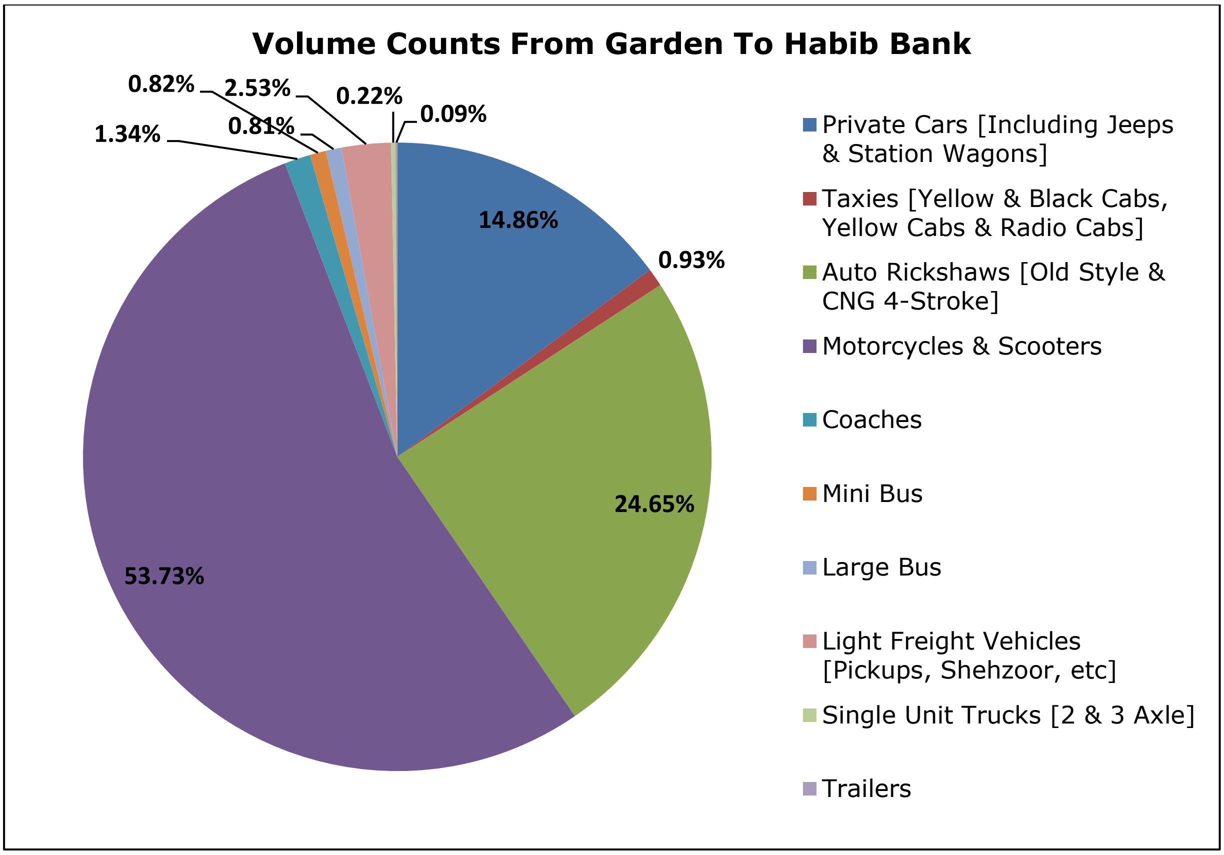


Figure 3.106: Volume Counts from Garden to Habib Bank (VC-26)

Motorcycles in high number at this location which constitutes around 53.73% and Private Cars has 14.86% vehicular traffic share. Para transit Includes Taxies and Rickshaws has second highest modal share with 25.58%. Out of other modal classifications, Public Transport have 3% share in terms of modal split and Freight vehicles have less value that is 2.84% modal share.

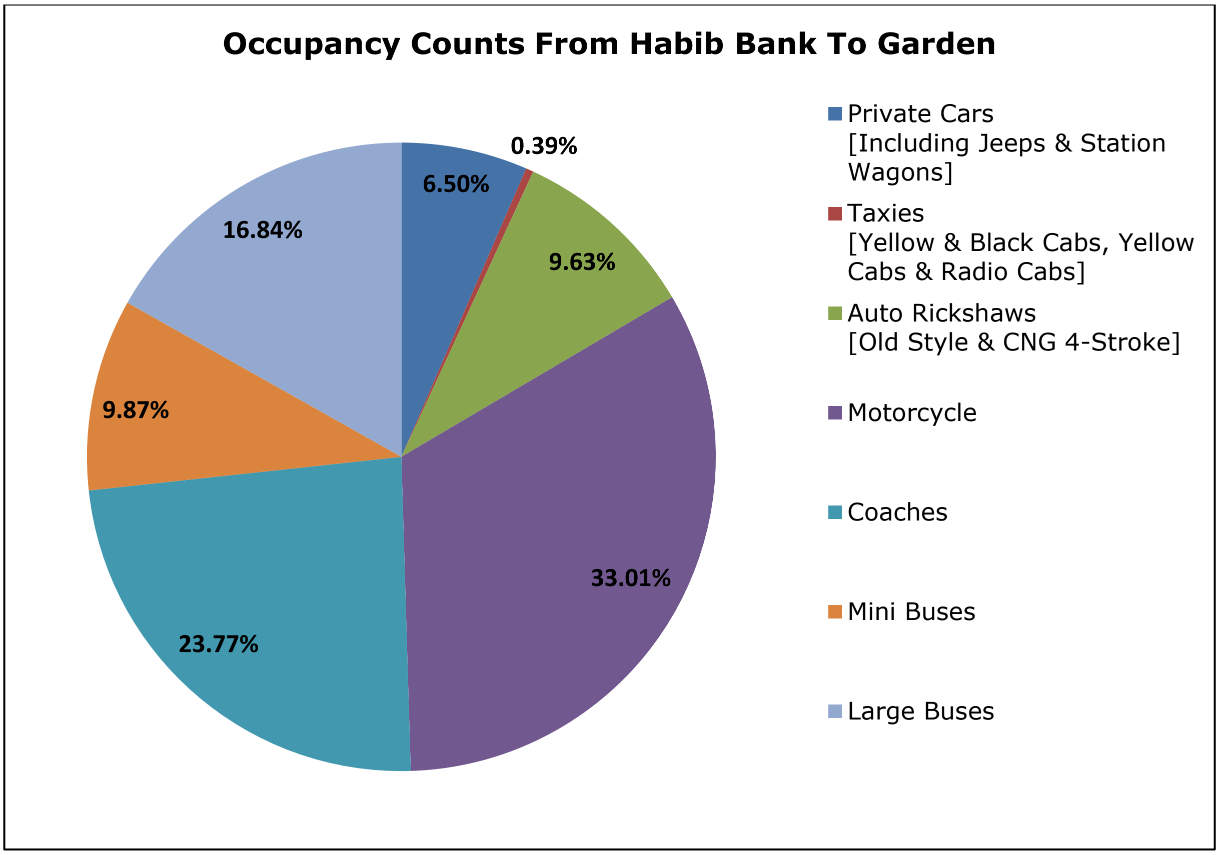


Figure 3.107: Occupancy Counts from Habib Bank to Garden (OC-26)

In this area occupancy rate for Public Transport are very high around 50.48% passengers counts in single direction from Habib Bank to Garden. Motorcycles are the second highest which makes 33.01%. Para transit is 10.02% occupant and Private cars makes 6.50% share.

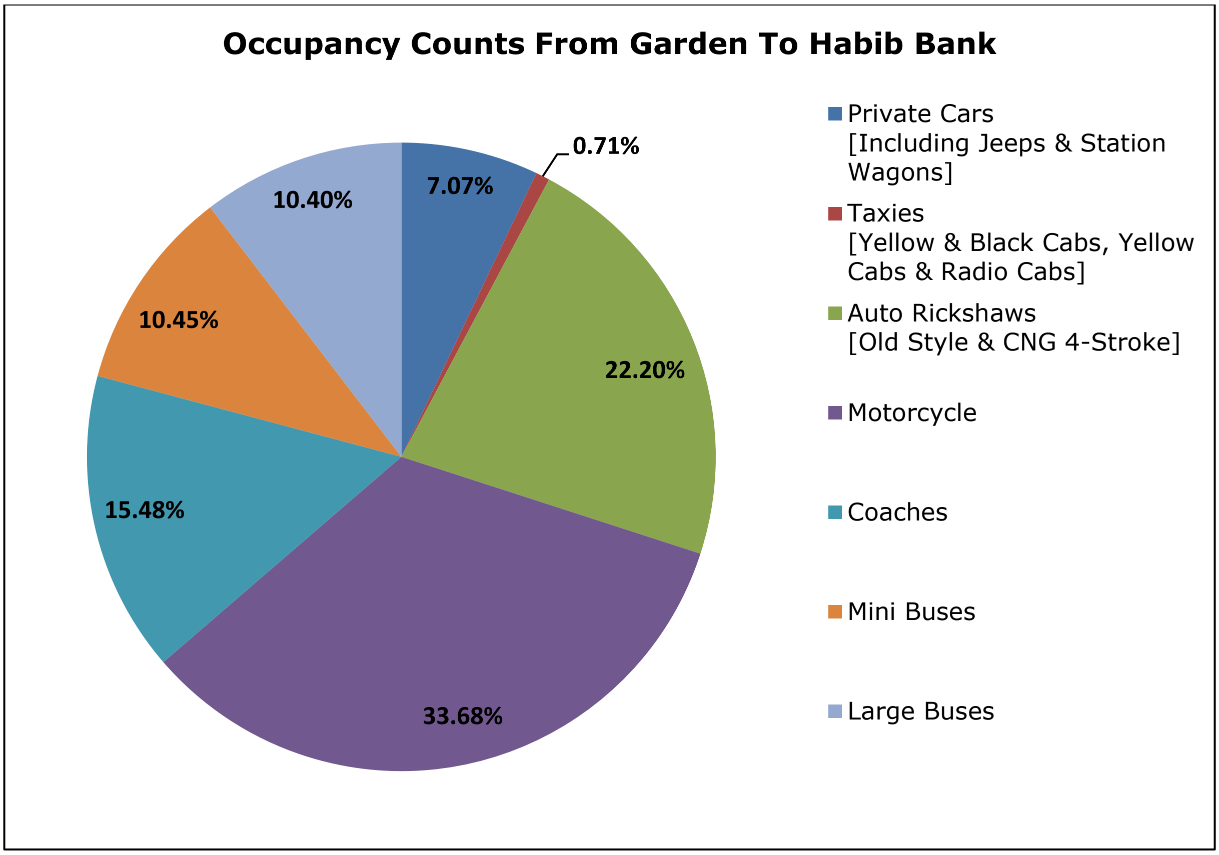


Figure 3.108: Occupancy Counts from Garden to Habib Bank (OC-26)

In this area occupancy rate for Public Transport is very high around 36.33% passengers counts in single direction from Garden to Habib Bank. Motorcycles are the second highest which makes 33.68%. Para transit is 22.91% occupant and Private Cars makes 7.07% share.

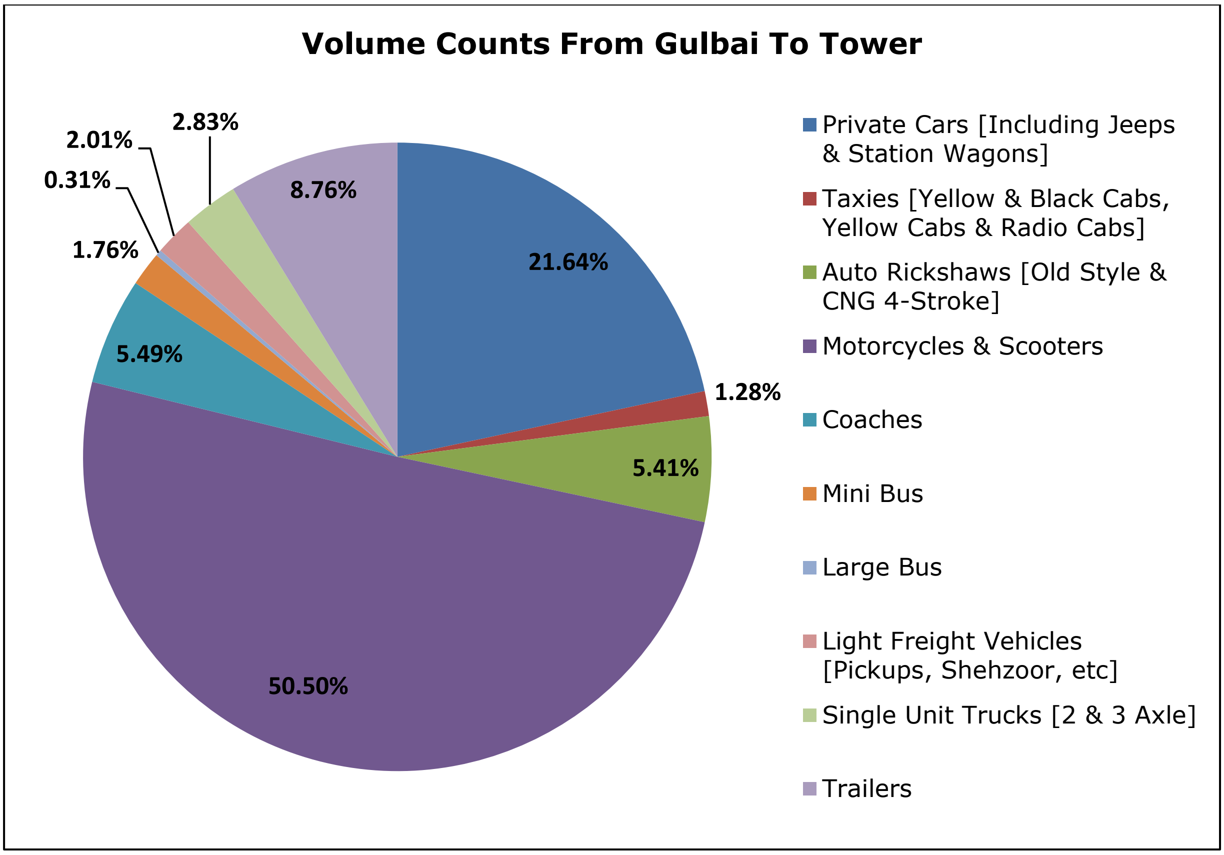


Figure 3.109: Volume Counts from Gulbai to Tower (VC-27)

Motorcycle is the most predominant mode of transport in the entire area. Private Cars have consisted of 22% mode share. Freight Traffic constitutes 13.59% of the total vehicular mix. Public Transport makes 8% of vehicular mix. Para Transit including Taxi and Rickshaws makes share around 7% of the total vehicular share.

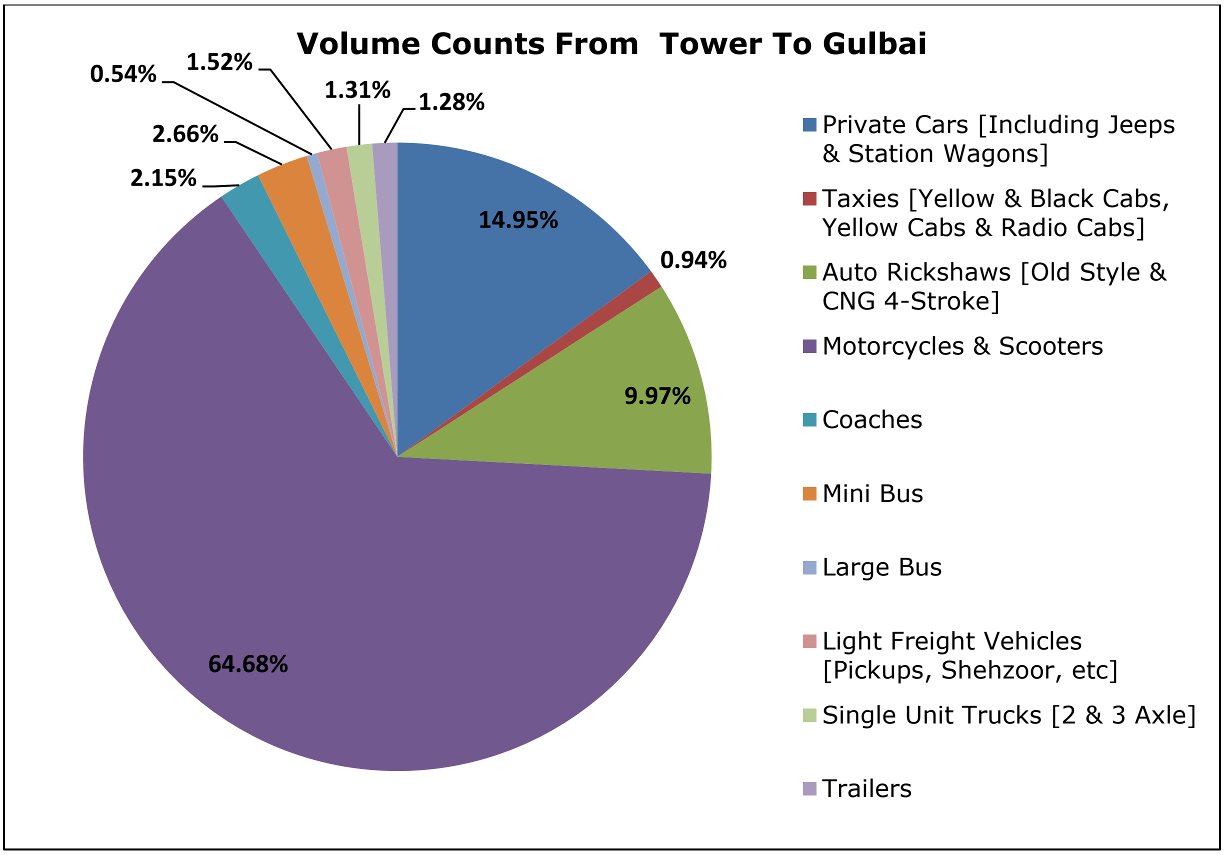


Figure 3.110: Volume Counts from Tower to Gulbai (VC-27)

Motorcycle is the most predominant mode of transport in the entire area. Private Cars have consisted of 15% mode share. Public Transport makes 5% of vehicular mix. Para Transit including Taxi and Rickshaws makes share around 11% of the total vehicular share. Freight Traffic constitutes 5% of the total vehicular mix.

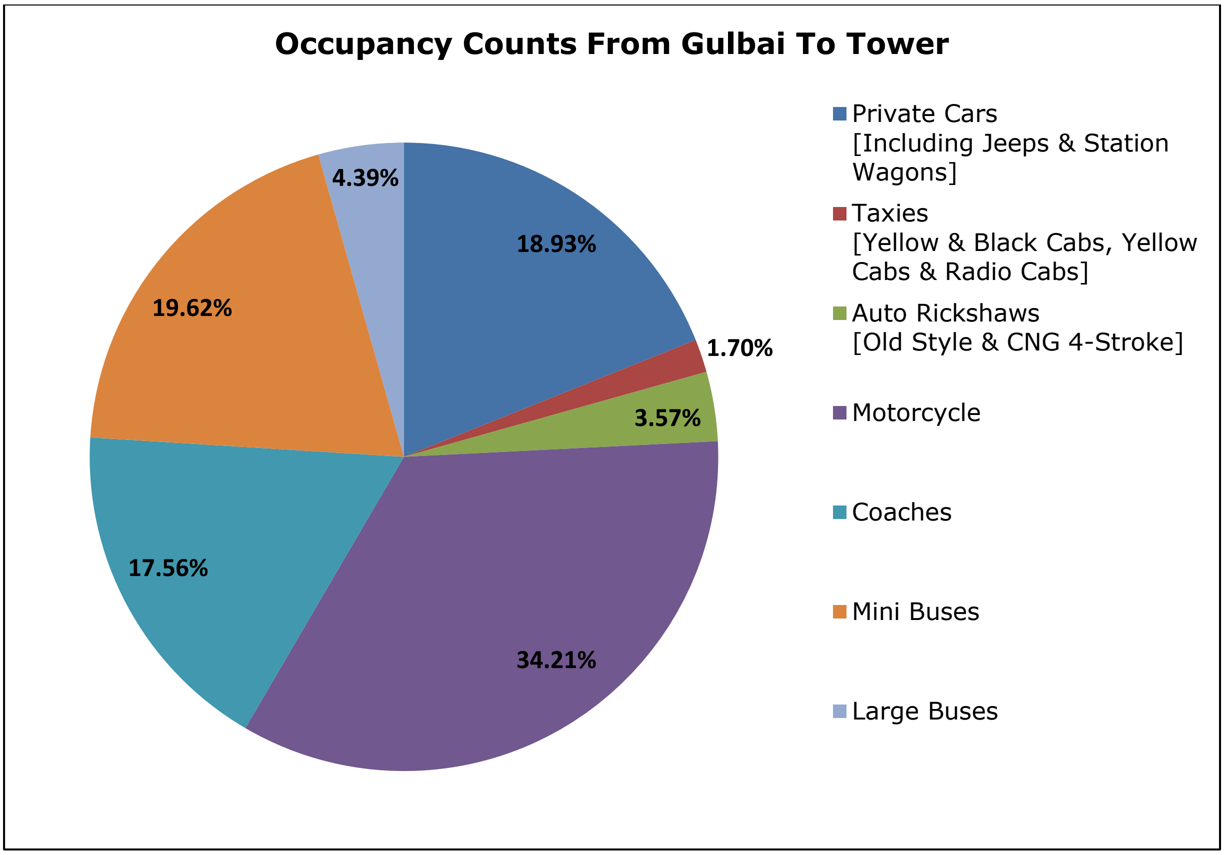


Figure 3.111: Occupancy Counts from Gulbai to Tower (OC-27)

In this area occupancy rate for Public Transport is very high around 42% passengers counts in single direction from Gulbai to Tower. Motorcycle Public Transport is the second highest which makes around 34%. Private Cars are 19% occupant. Para transit makes fewer shares around 5%.

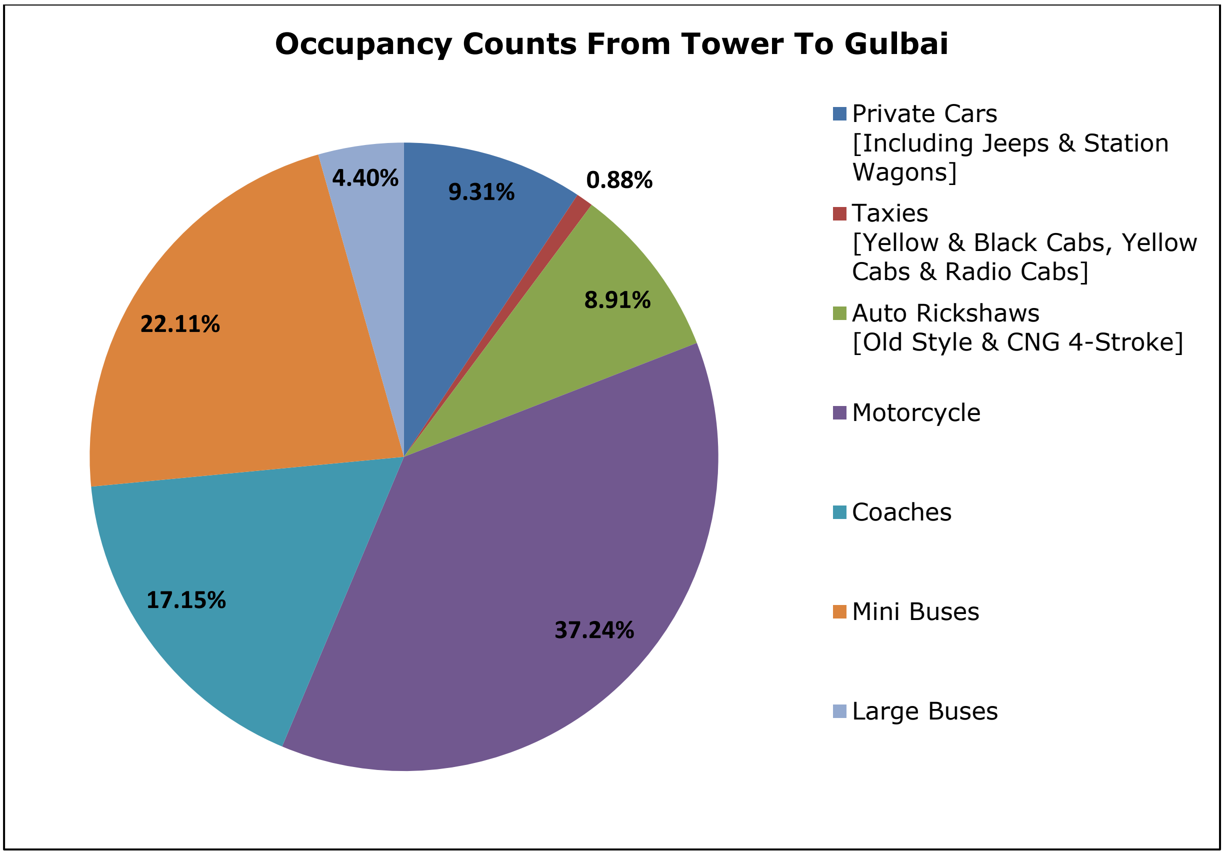


Figure 3.112: Occupancy Counts from Tower to Gulbai (OC-27)

In this area occupancy rate for Public Transport is very high around 43% passengers counts in single direction from Tower to Gulbai. Motorcycle is the second highest which makes around 37%. Para transit is 10% occupant. Private Cars makes fewer shares around 9.31%.

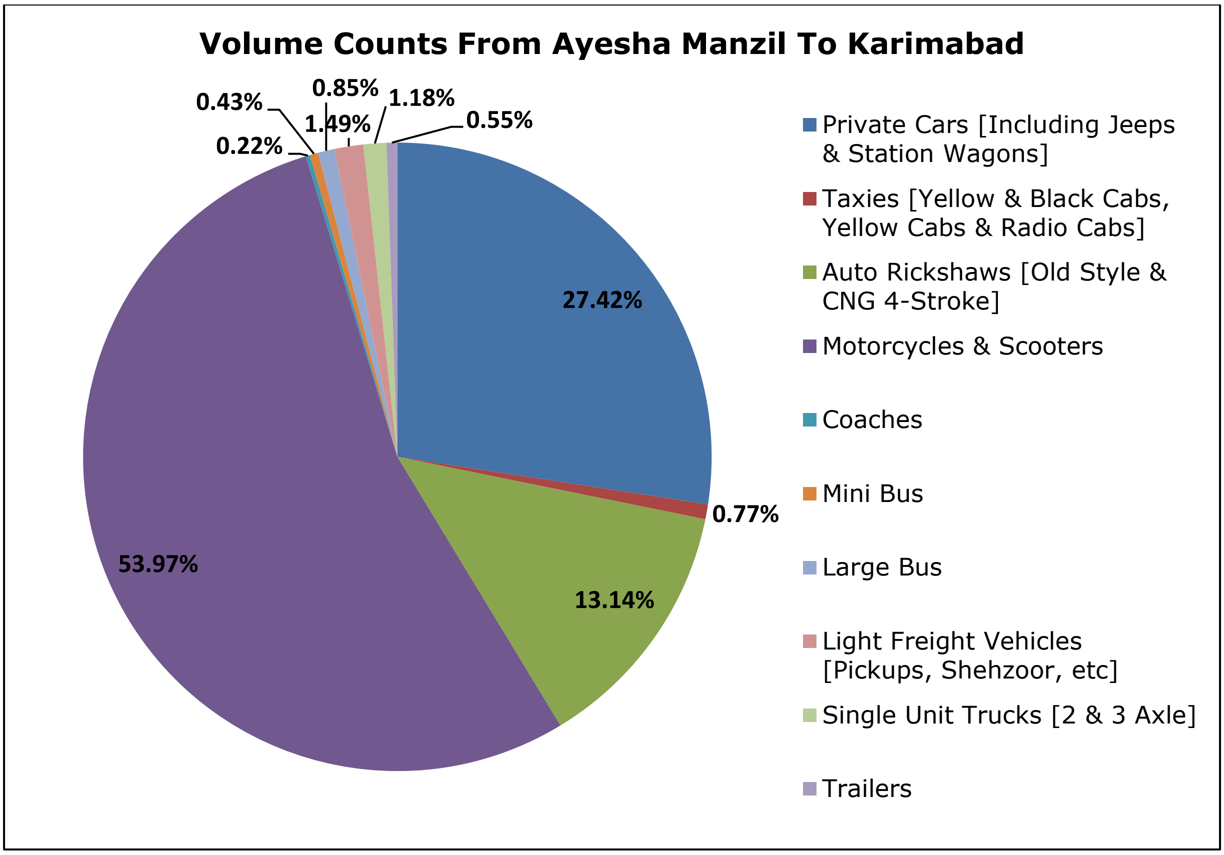


Figure 3.113: Volume Counts from Ayesha Manzil to Karimabad (VC-28)

Motorcycles constitute the largest vehicle share with 54%, followed by Private Cars with 28%. Para Transit share in the total vehicle fleet is high at 14%. Rest of the modal distribution consists of Freight Vehicles is 3% and Public transport is 1%.

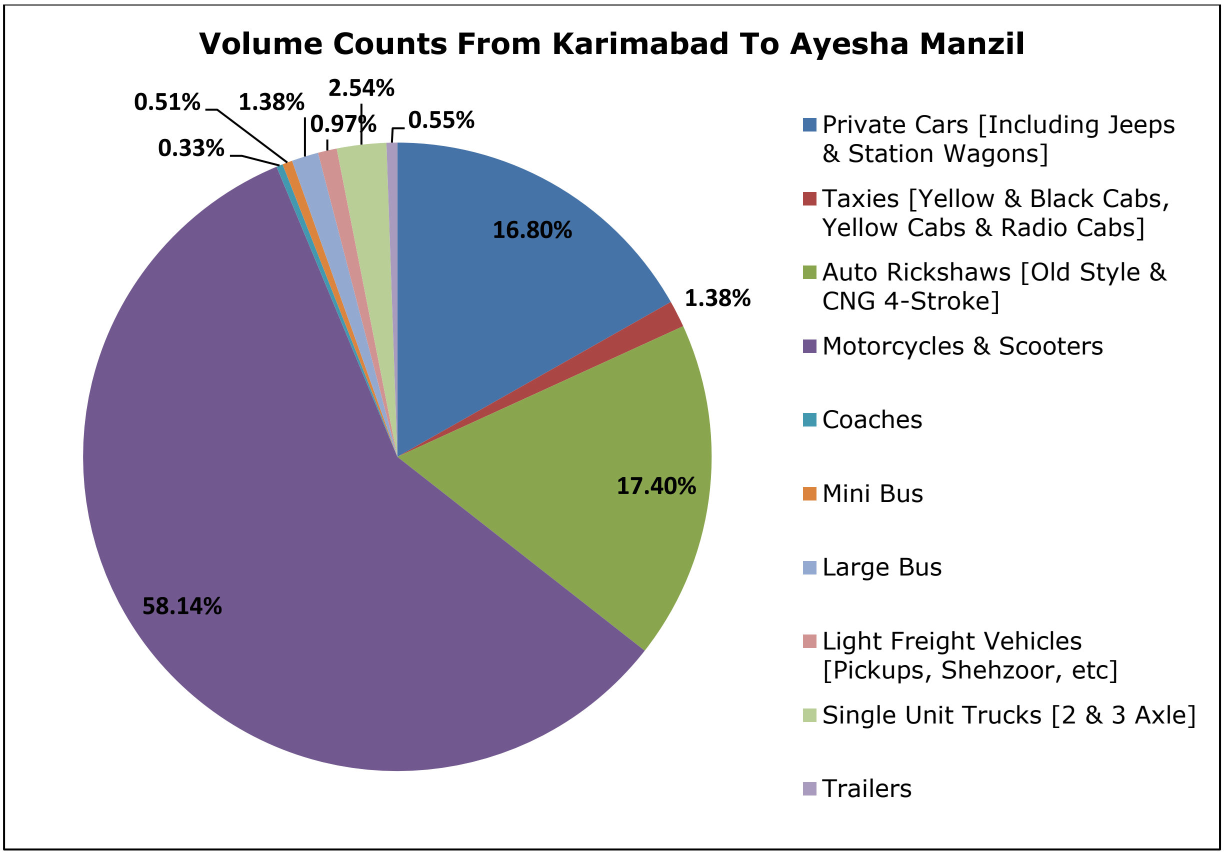


Figure 3.114: Volume Counts from Karimabad to Ayesha Manzil (VC-28)

Motorcycles constitute the largest vehicle share with 58%, followed by Private Cars with 17%. Para Transit share in the total vehicle fleet is high at 19%. Rest of the modal distribution consists of Freight Vehicles is 4% and Public transport is 2%.

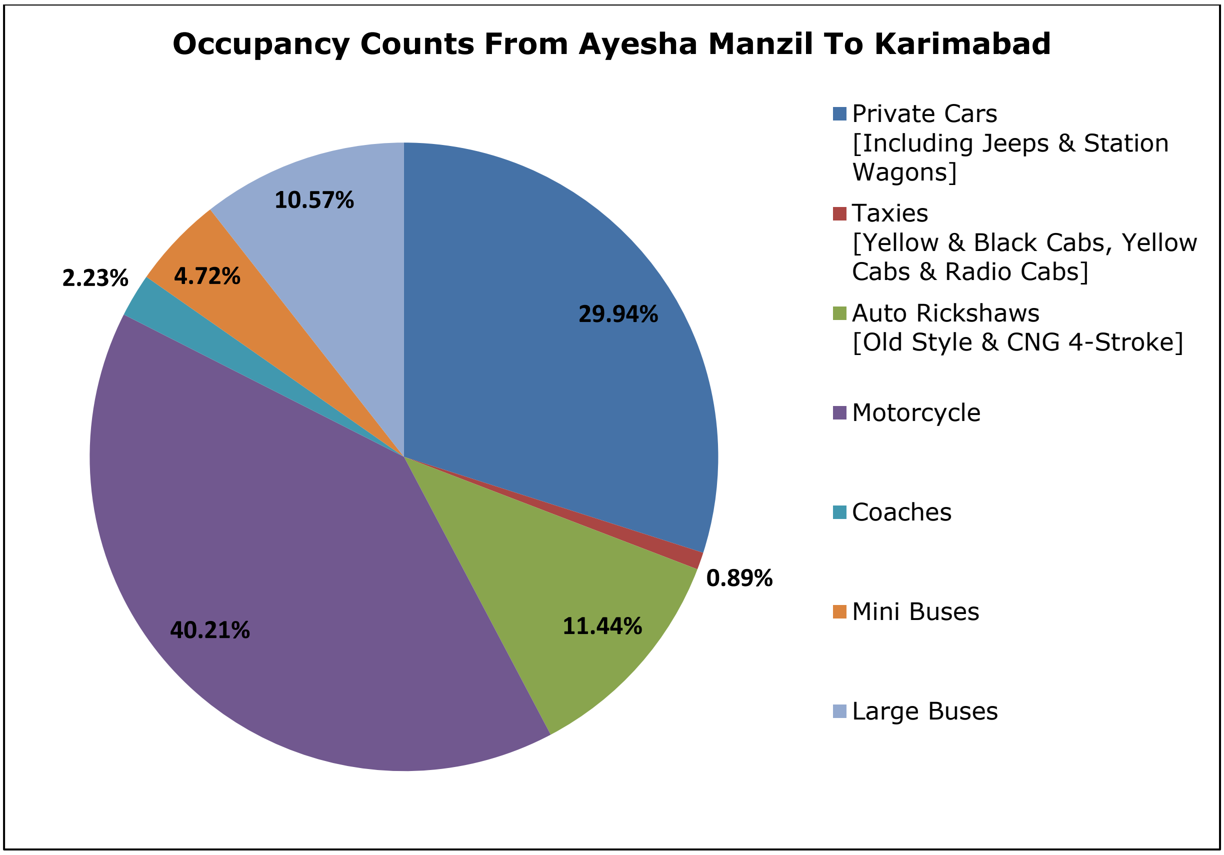


Figure 3.115: Occupancy Counts from Ayesha Manzil to Karimabad (OC-28)

In this area occupancy rate for Motorcycle is very high around 40% passengers counts in single direction from Ayesha Manzil to Karimabad. Private Cars are the second highest which makes around 30%. Public Transport is 17.52 % occupant. Para transit makes fewer shares around 12%.

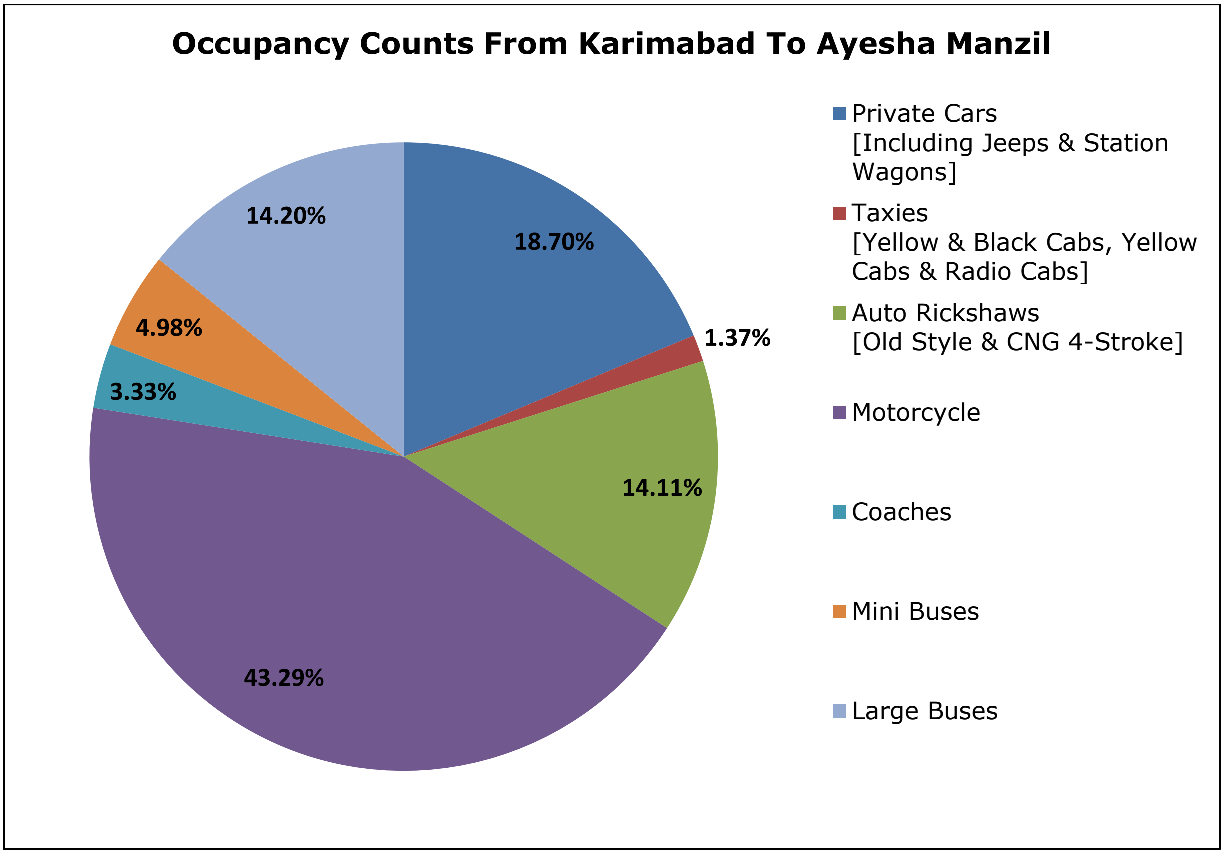


Figure 3.116: Occupancy Counts from Karimabad to Ayesha Manzil (OC-28)

In this area occupancy rate for Motorcycle is very high around 43% passengers counts in single direction from Karimabad to Ayesha Manzil. Private Cars are the second highest which makes around 19%. Public Transport is 22.5 % occupant. Para transit makes fewer shares around 15%.

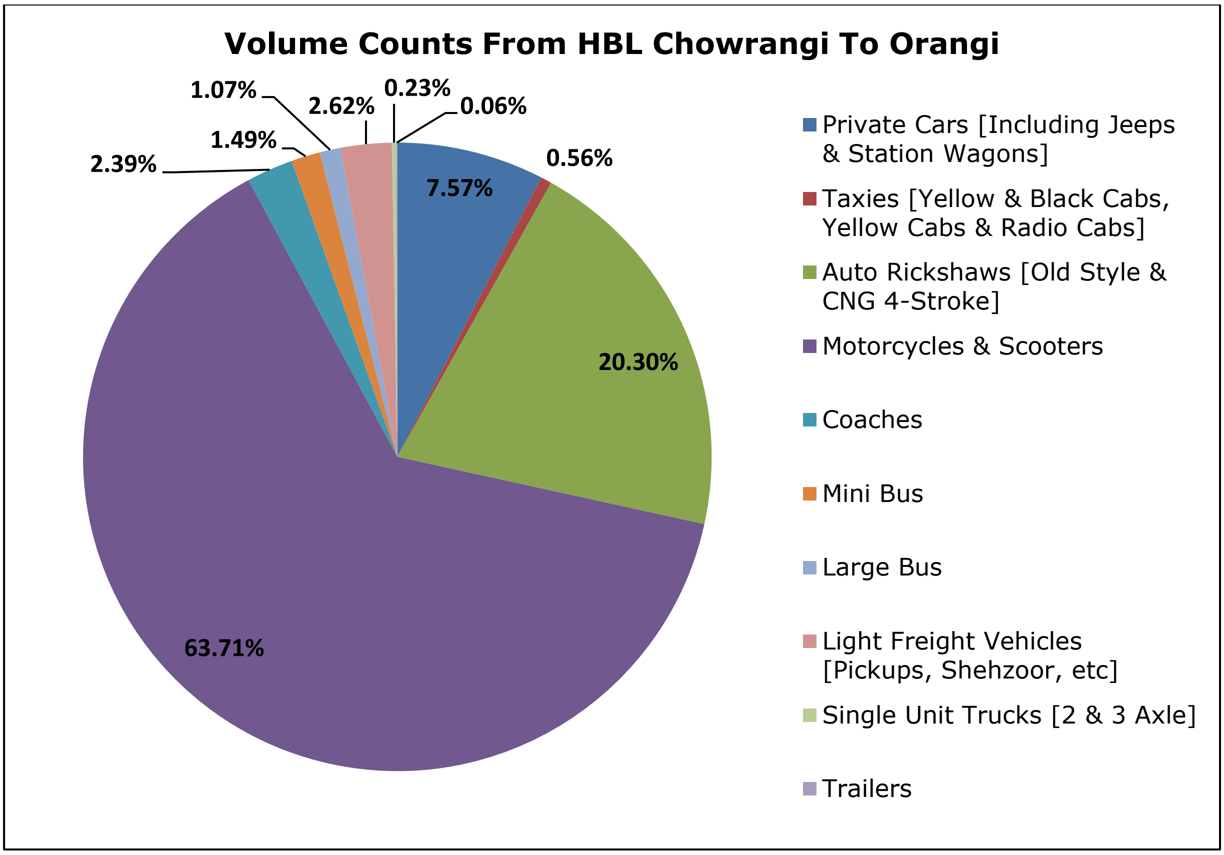


Figure 3.117: Volume Counts from HBL Chowrangi to Orangi (VC-29)

Motor Cycles and Auto Rickshaw are predominant mode of transport even in this segment as they sum up to around 84% of the total modal split with 63.71% and 20.30% share respectively. Other major modes in this area are Private cars which constitute around 7.57% and Public Transport which is 5% of the total modal share.

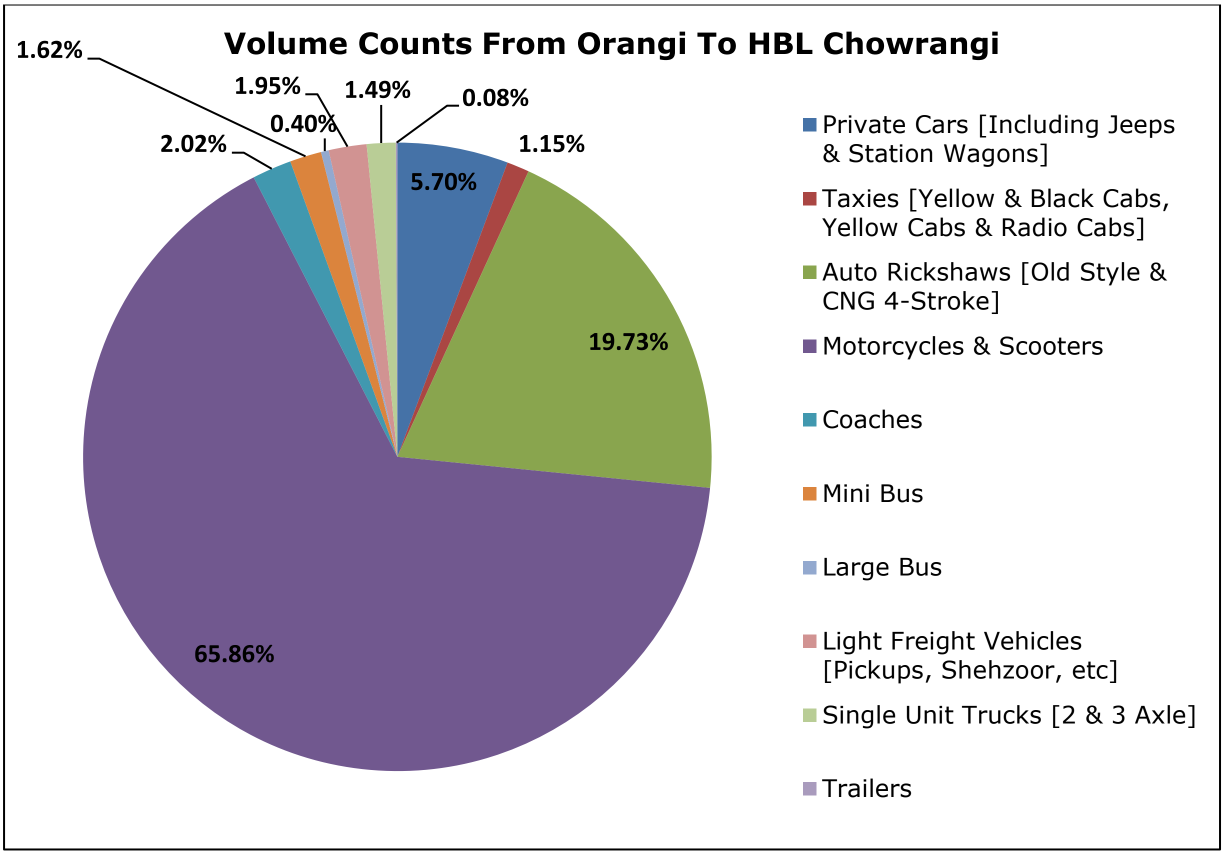


Figure 3.118: Volume Counts from Orangi to HBL Chowrangi (VC-29)

Motor Cycles and Autorickshaws are predominant mode of transport even in this segment as they sum up to around 85.5% of the total modal split with 65.86% and 19.73% share respectively. Other major modes in this area are Private cars which constitute around 5.70% and Public Transport which is 4% of the total modal share.

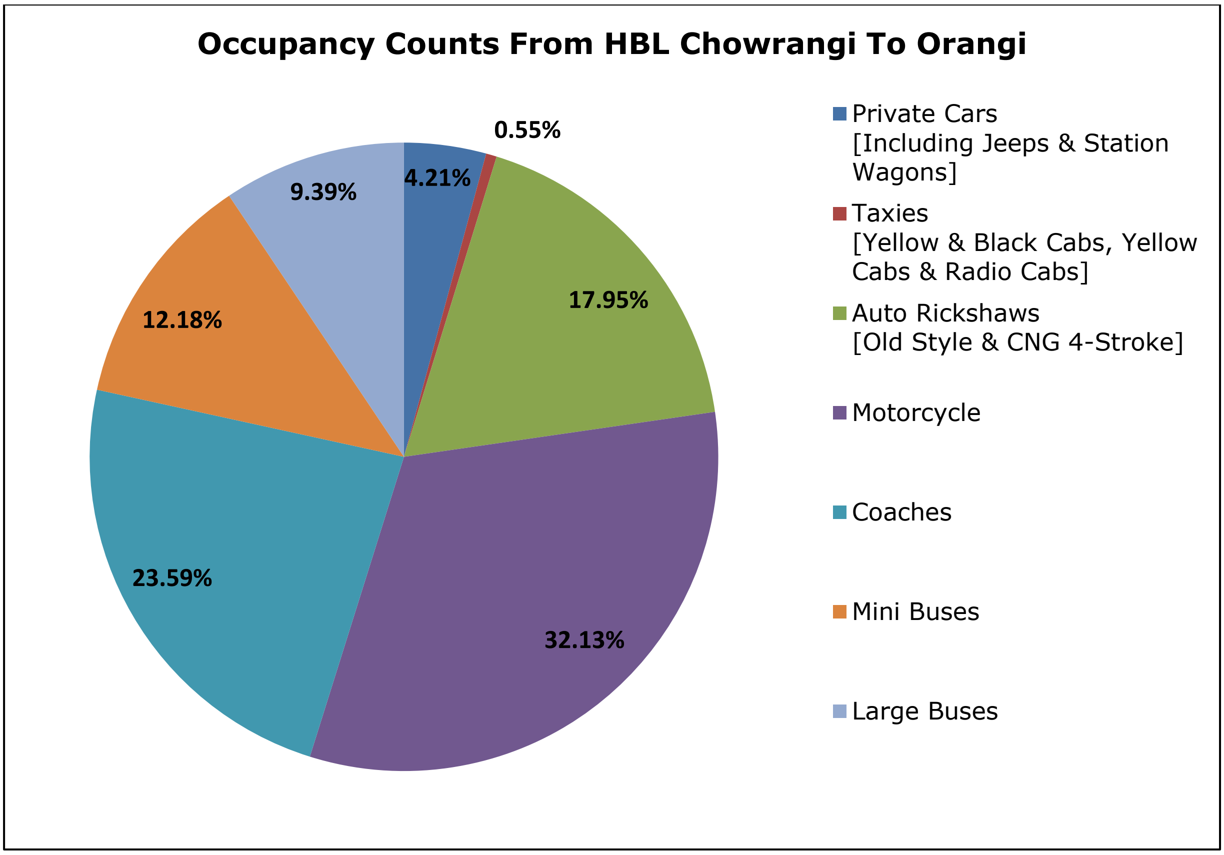


Figure 3.119: Occupancy Counts from HBL Chowrangi to Orangi (OC-29)

In this area occupancy rate for Public Transport is very high around 45% passengers counts in single direction from HBL Chowrangi to Orangi. Motorcycle are the second highest which makes around 32%. Para transit is 18% occupant. Private Cars makes fewer shares around 4%.

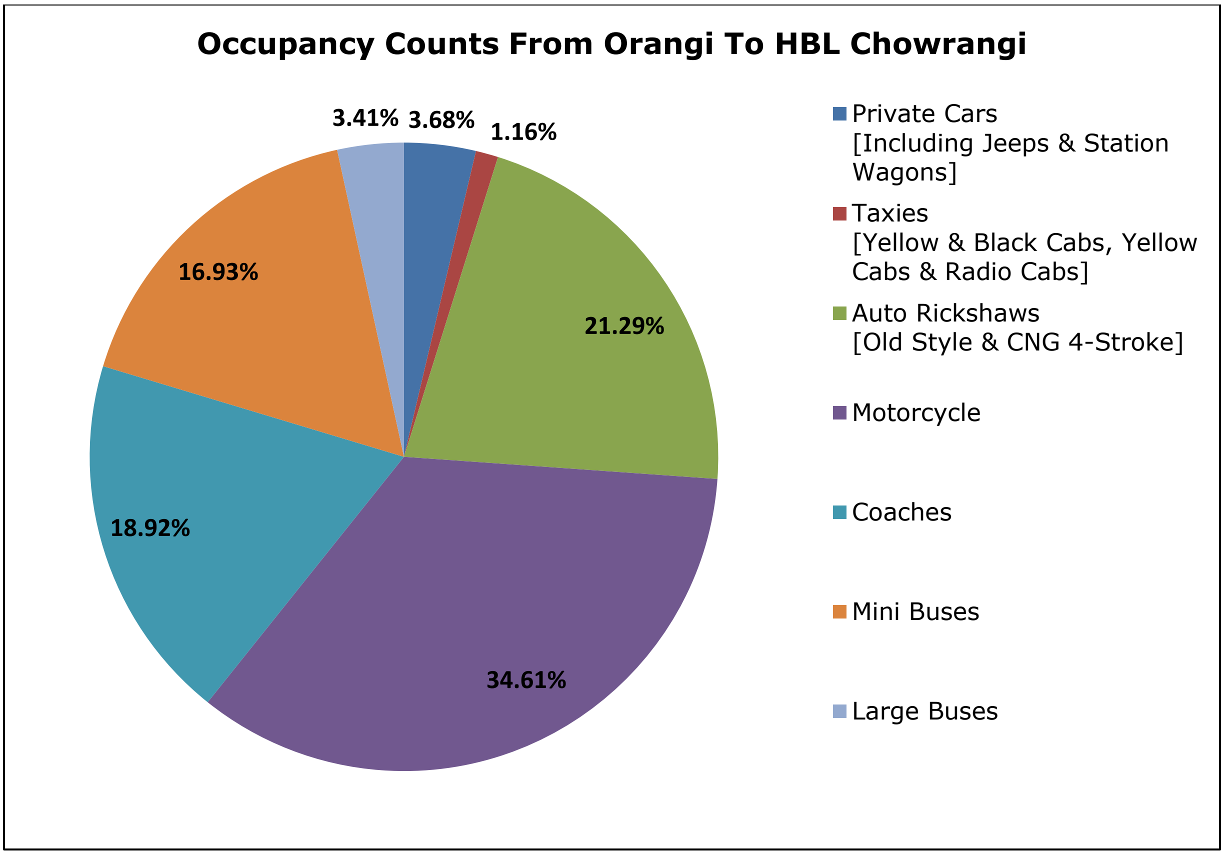


Figure 3.120: Occupancy Counts from Orangi to HBL Chowrangi (OC-29)

In this area occupancy rate for Public Transport is very high around 39% passengers counts in single direction from Orangi to HBL Chowrangi. Motorcycle is the second highest which makes around 34%. Para transit is 22% occupant. Private Cars makes fewer shares around 4%.

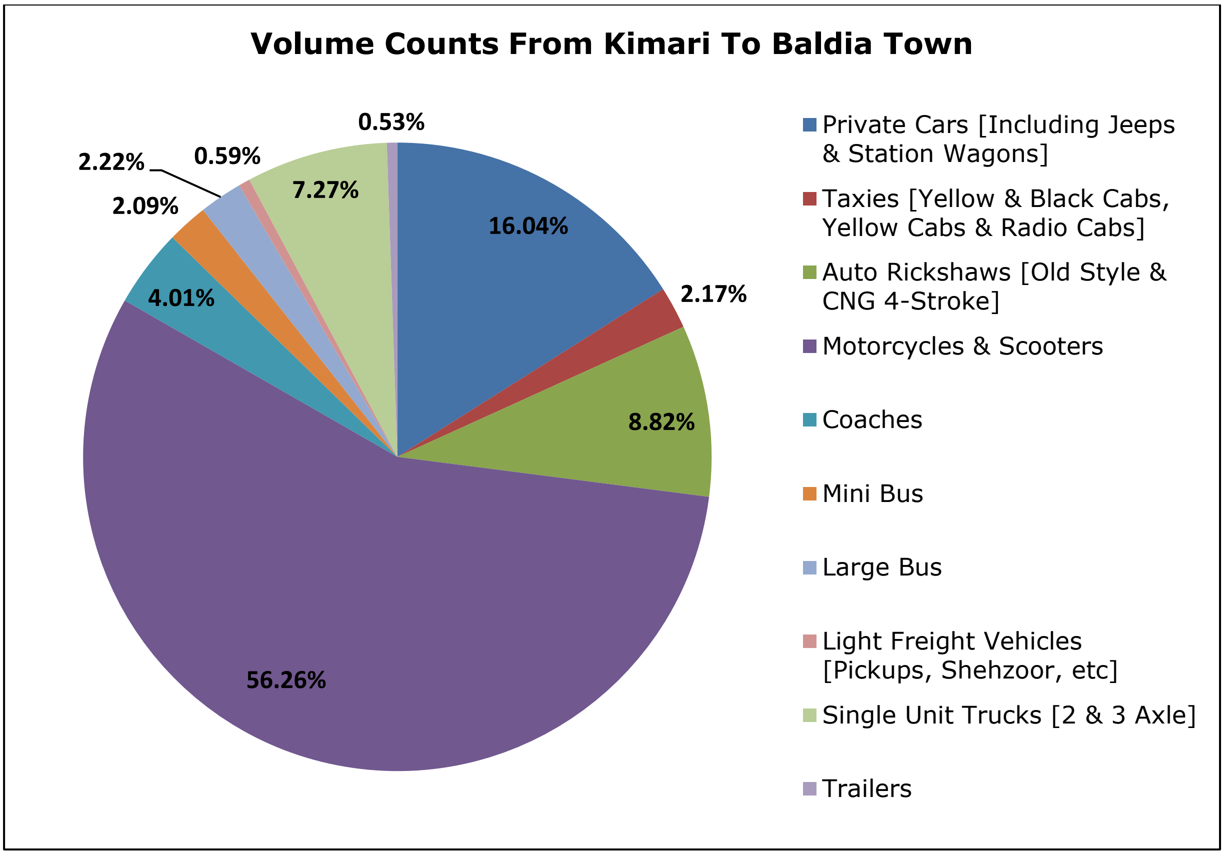


Figure 3.121: Volume Counts from Kimari to Baldia Town (VC-30)

Motorcycle is in high number at this location which constitutes around 56.26% with less number of Public Transport that is 8%. Private Cars has 16.04% vehicular traffic share. Out of other modal classifications, Para Transit have 11% share in terms of modal split and Freight vehicles have less value that is 9% modal share.

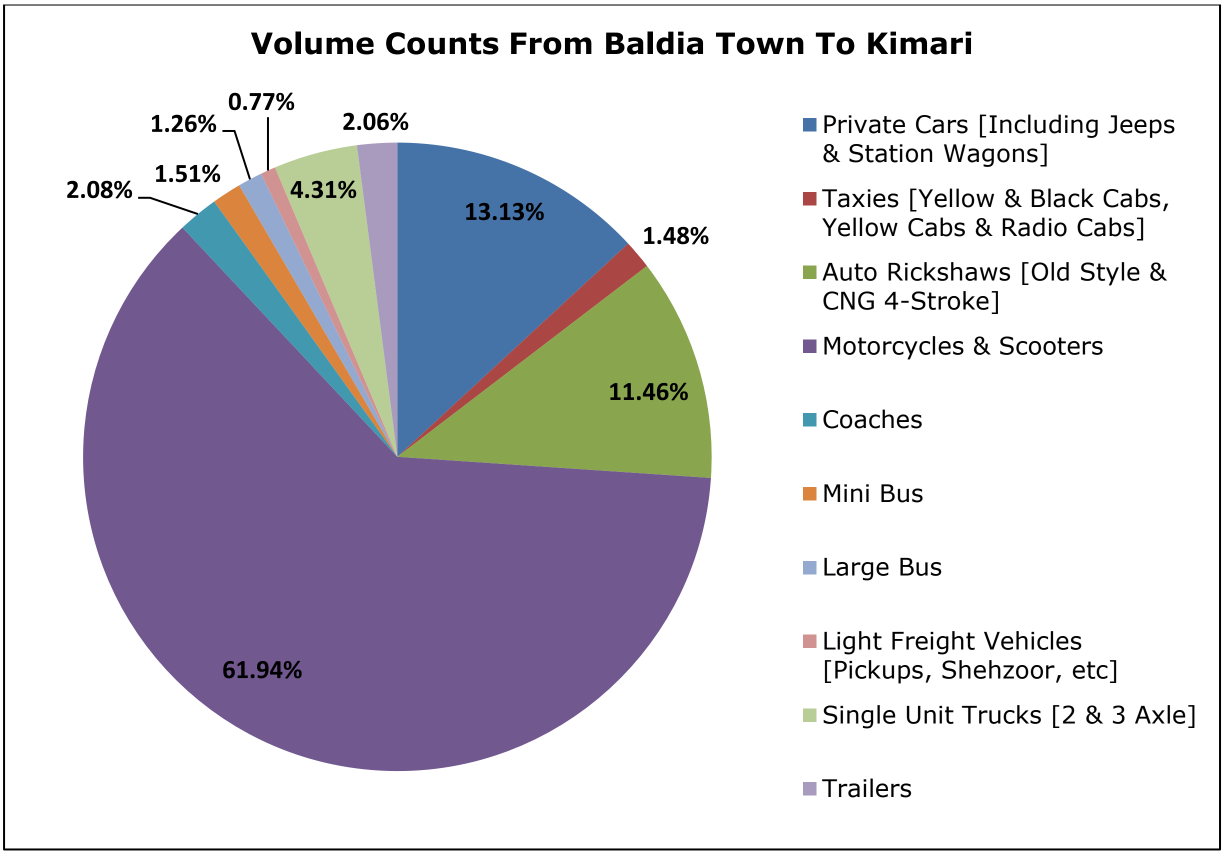


Figure 3.122: Volume Counts from Baldia Town to Kimari (VC-30)

Motorcycle is in high number at this location which constitutes around 61.9% with less number of Public Transport that is 5%. Private Cars has 13.13% vehicular traffic share. Out of other modal classifications, Para Transit have 13% share in terms of modal split and Freight vehicles have less value that is 6% modal share.

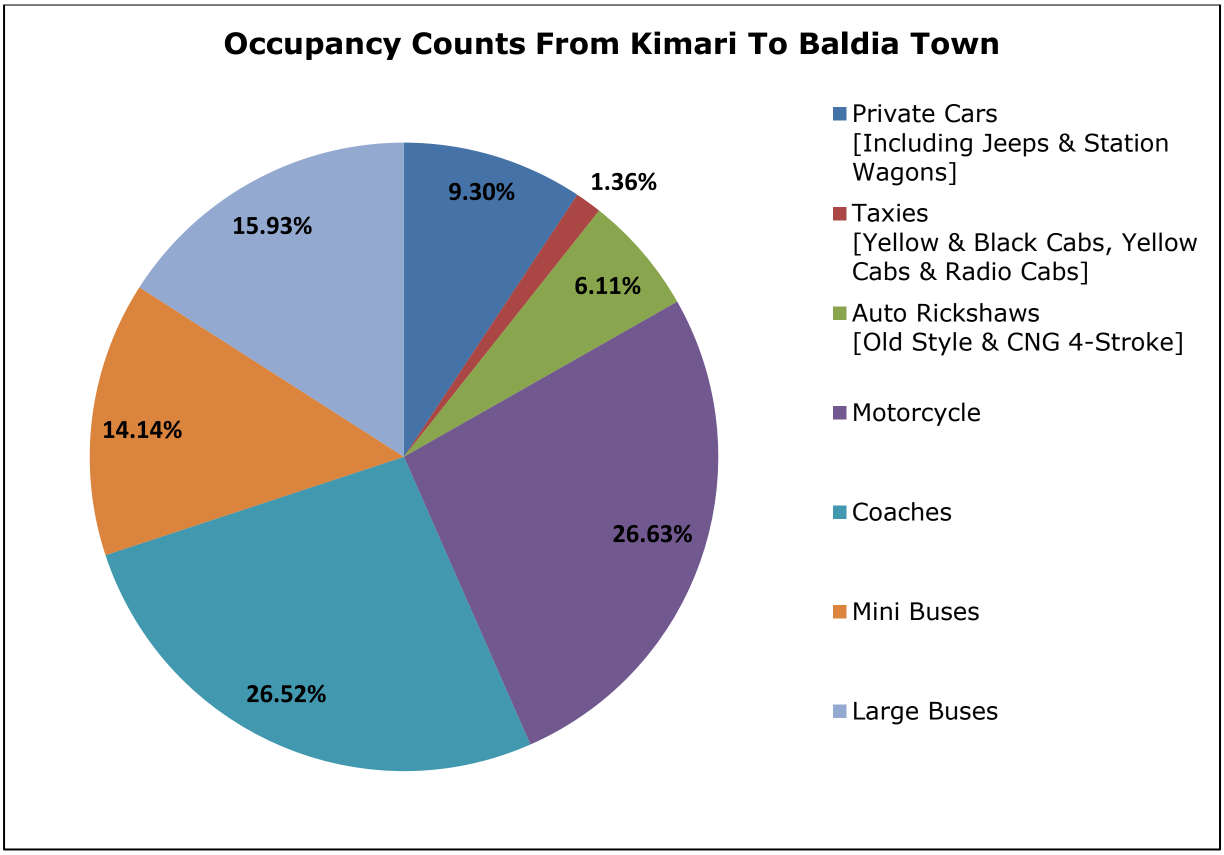


Figure 3.123: Occupancy Counts from Kimari to Baldia Town (OC-30)

In this area occupancy rate for Public Transport is very high around 56% passengers counts in single direction from Kimari to Baldia Town. Motorcycle is the second highest which makes around 26.63%. Private Cars are 9.30% occupant. Para Transit makes fewer shares around 7%.

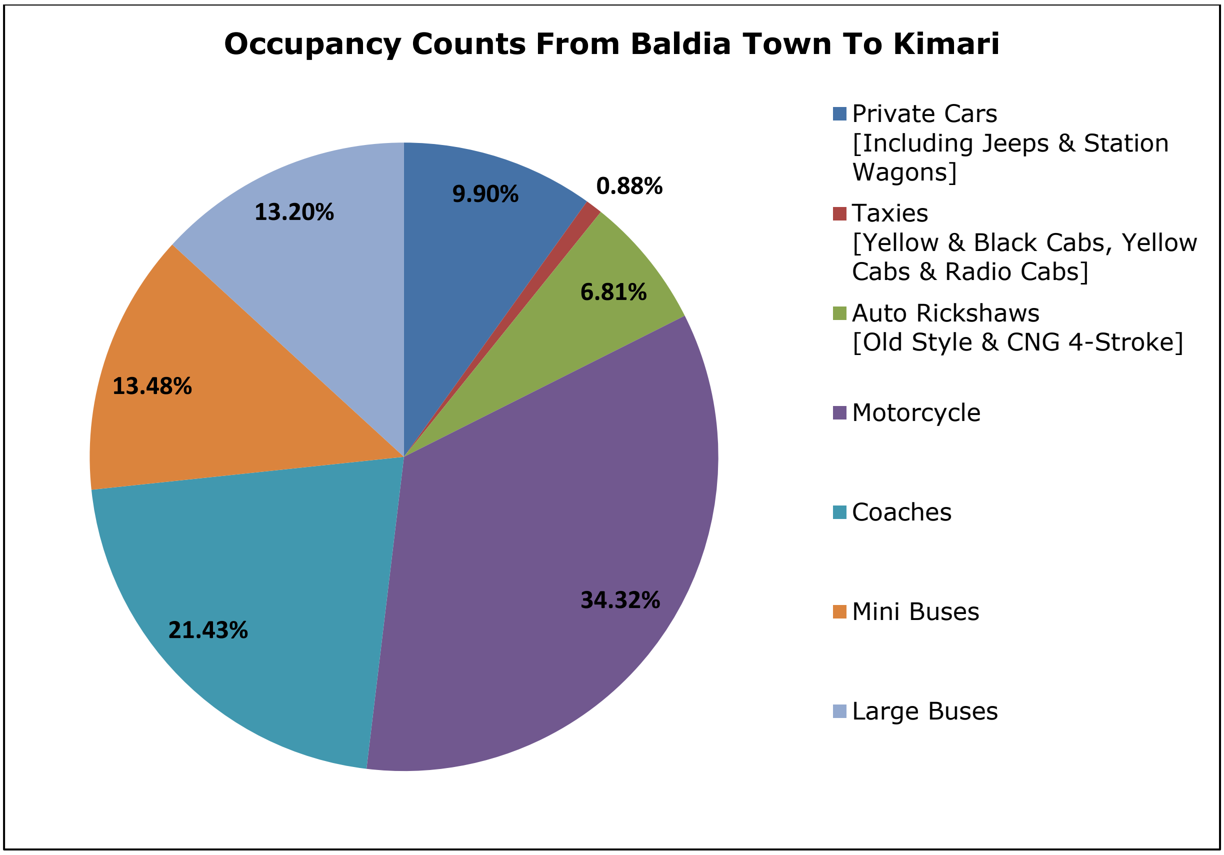


Figure 3.124: Occupancy Counts from Baldia Town to Kimari (OC-30)

In this area occupancy rate for Public Transport is very high around 48% passengers counts in single direction from Baldia Town to Kimari. Motorcycle is the second highest which makes around 34.32%. Private Cars are 10% occupant. Para Transit makes fewer shares around 8%.

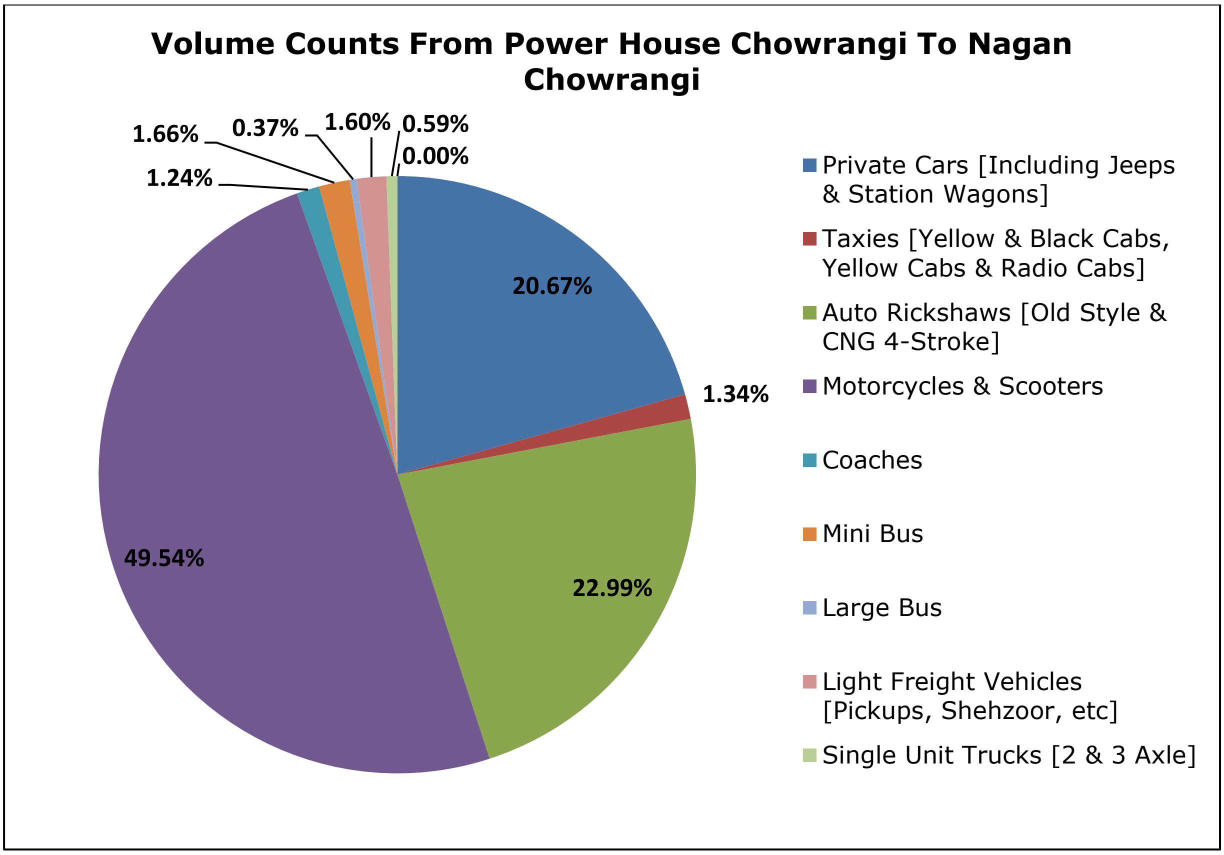


Figure 3.125: Volume Counts from Power House Chowrangi to Nagan Chowrangi (VC-31)

At this particular location Motorcycles has a high modal share that is 49.5% whereas Auto Rickshaws are almost 23% of the total modal split. Private Cars at this location constitutes around 20.6% whereas Taxis are less that is 1.34%. Public Transport and Light Freight Vehicles are in very low numbers in this segment of Power House Chowrangi to Nagan Chowrangi which combined sums up to just 5% of the total vehicular mix.

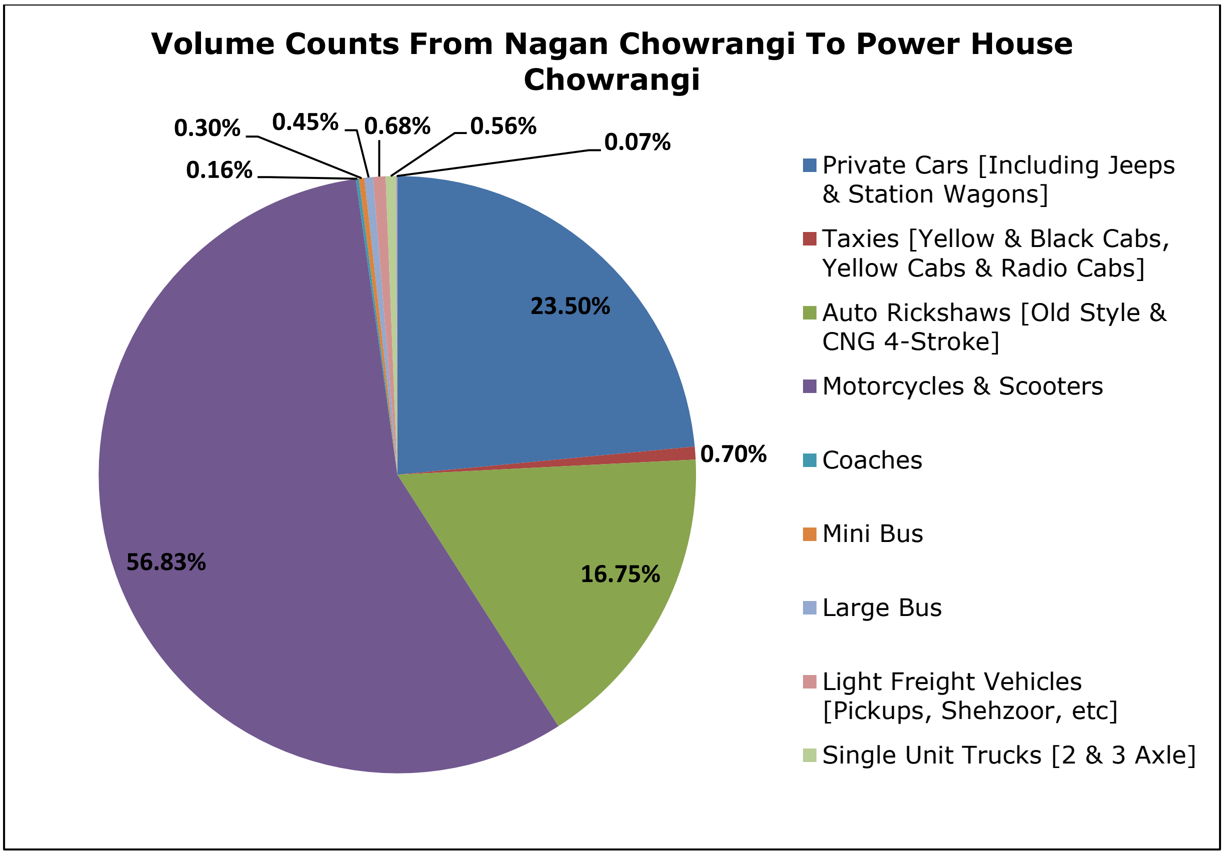


Figure 3.126: Volume Counts from Nagan Chowrangi to Power House Chowrangi (VC-31)

At this particular location Motorcycles has a high modal share that is 57% whereas Private Cars are almost 23% of the total modal split. Auto Rickshaws at this location constitutes around 16.75% whereas Taxis are less that is 1%. Public Transport and Light Freight Vehicles are in very low numbers in this segment of to Nagan Chowrangi to Power House Chowrangi which combined sums up to just 2% of the total vehicular mix.

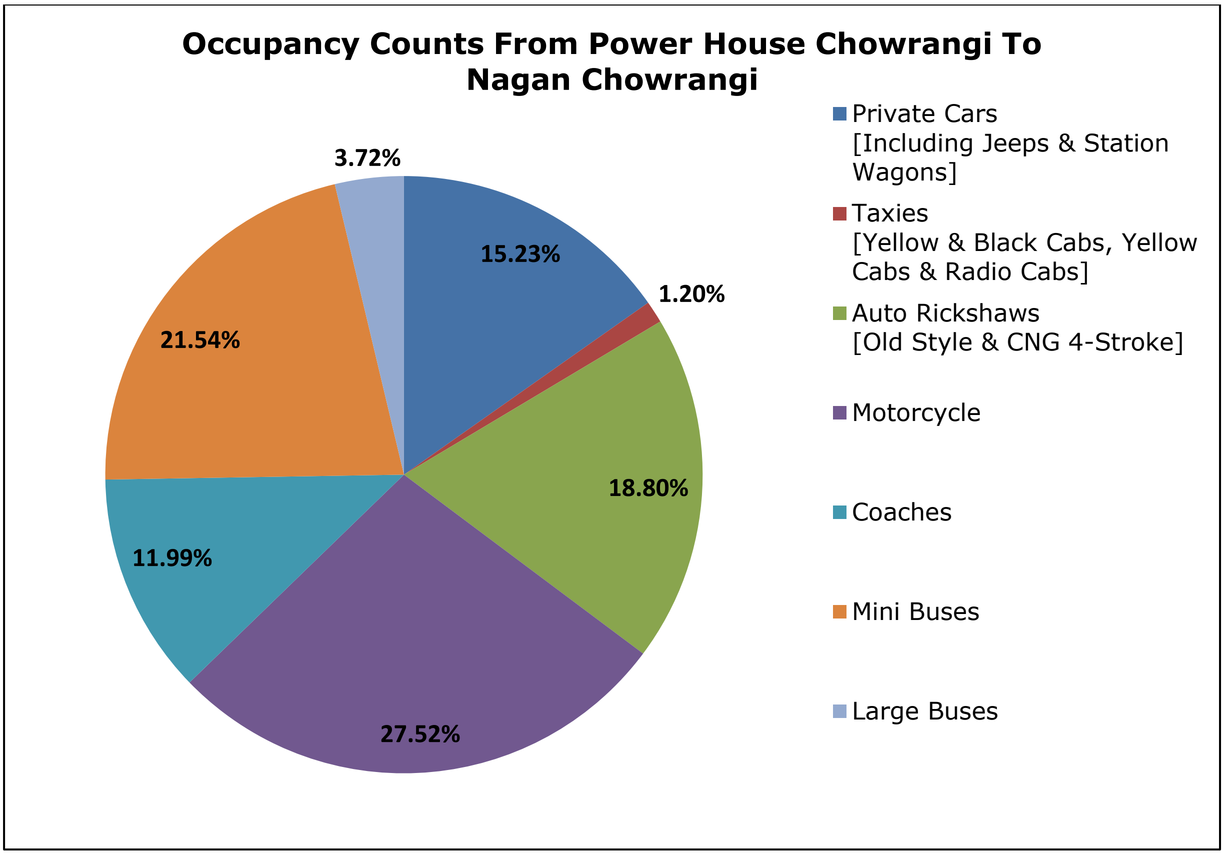


Figure 3.127: Occupancy Counts from Power House Chowrangi to Nagan Chowrangi (OC-31)

In this area occupancy rate for Public Transport is very high around 37% passengers counts in single direction from Power House Chowrangi to Nagan Chowrangi. Motorcycle is the second highest which makes around 28%. Para transit is 20% occupant. Private Cars makes fewer shares around 15%.

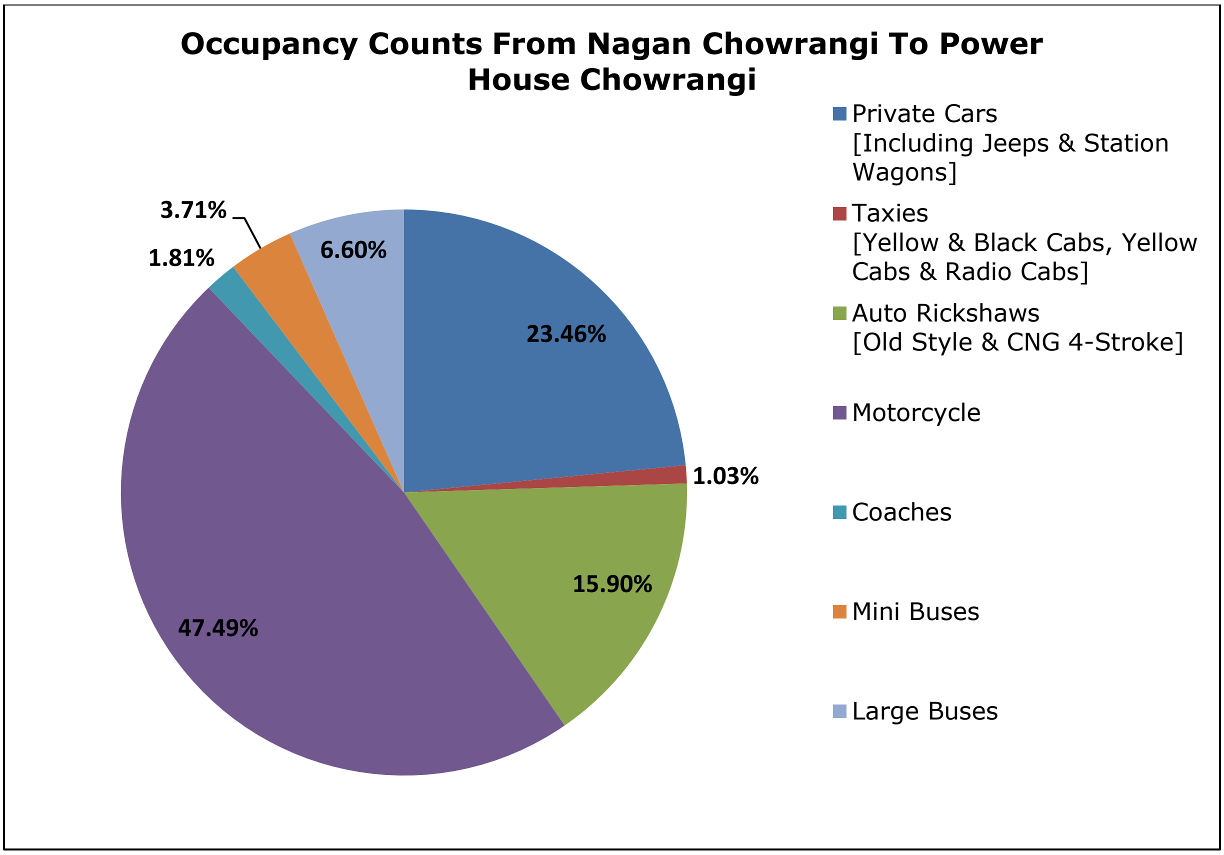


Figure 3.128: Occupancy Counts Nagan Chowrangi to Power House Chowrangi (OC-31)

In this area occupancy rate for Motorcycle is very high around 48% passengers counts in single direction from Nagan Chowrangi to Power House Chowrangi. Private Cars is the second highest which makes around 23%. Para transit is 17% occupant. Public Transport makes fewer shares around 12%.

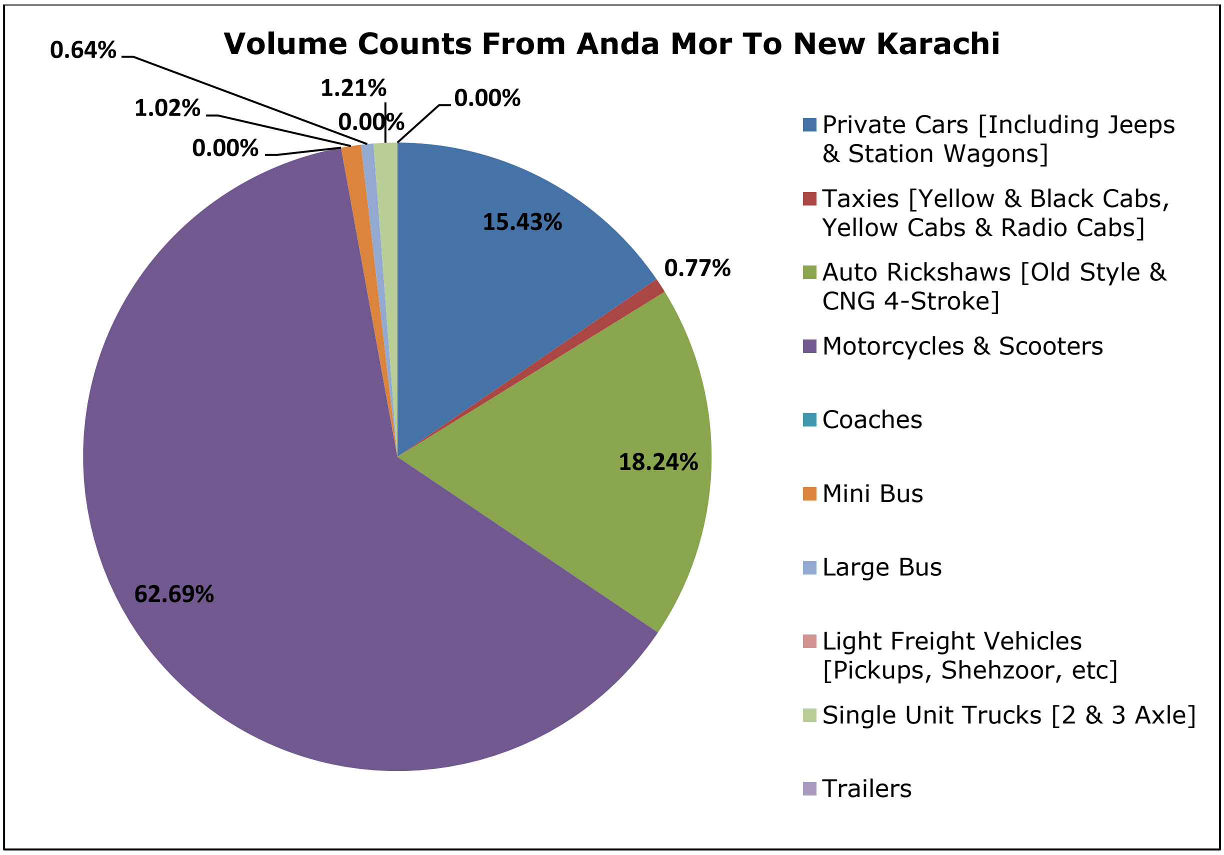


Figure 3.129: Volume Counts from Anda Mor to New Karachi (VC-32)

Motorcycles constitute the largest vehicle share with 62.69%, followed by Private Cars with 15.43%. Paratransit share in the total vehicle fleet is high at 19%. Rest of the modal distribution consists of Freight Vehicles is 1% and Public Transport is 2%.

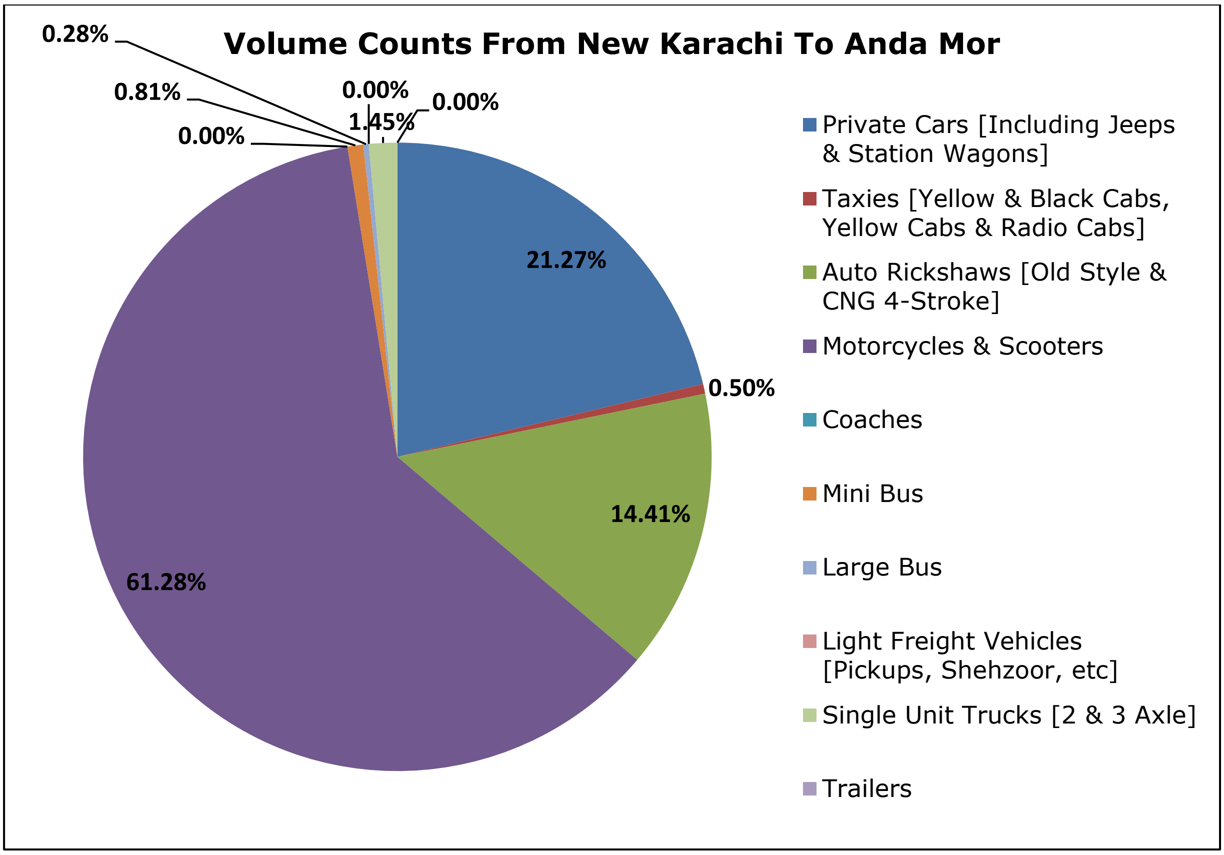


Figure 3.130: Volume Counts from New Karachi to Anda Mor (VC-32)

Motorcycles constitute the largest vehicle share with 61.28%, followed by Private Cars with 21.27%. Para transit share in the total vehicle fleet is high at 15%. Rest of the modal distribution consists of Freight Vehicles and Public Transport both makes less than 1% share of vehicular mix.

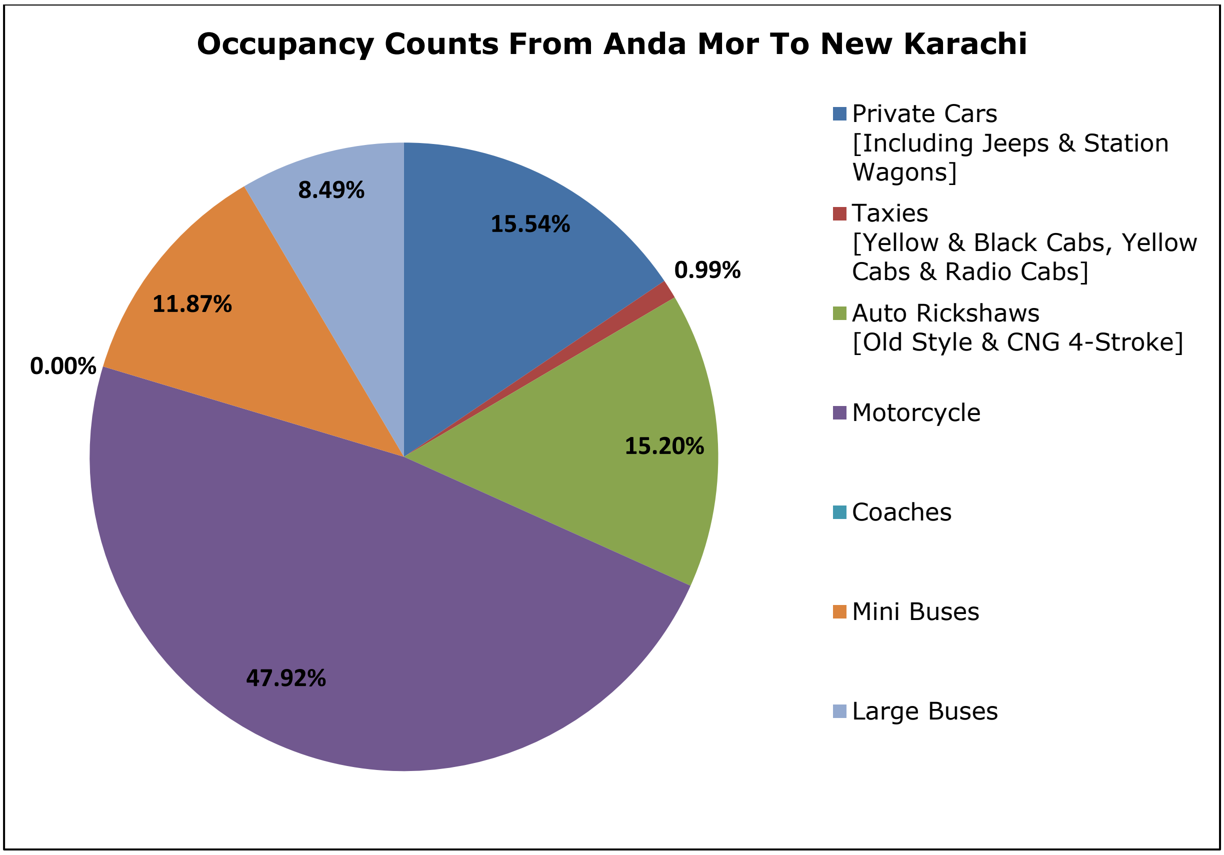


Figure 3.131: Occupancy Counts from Anda Mor to New Karachi (OC-32)

In this area occupancy rate for Motorcycles is very high around 48% passengers counts in single direction from Anda Mor to New Karachi. Public Transport is the second highest which makes around 20%. Para Transit are 16% occupant. Private cars make fewer shares around 15%.

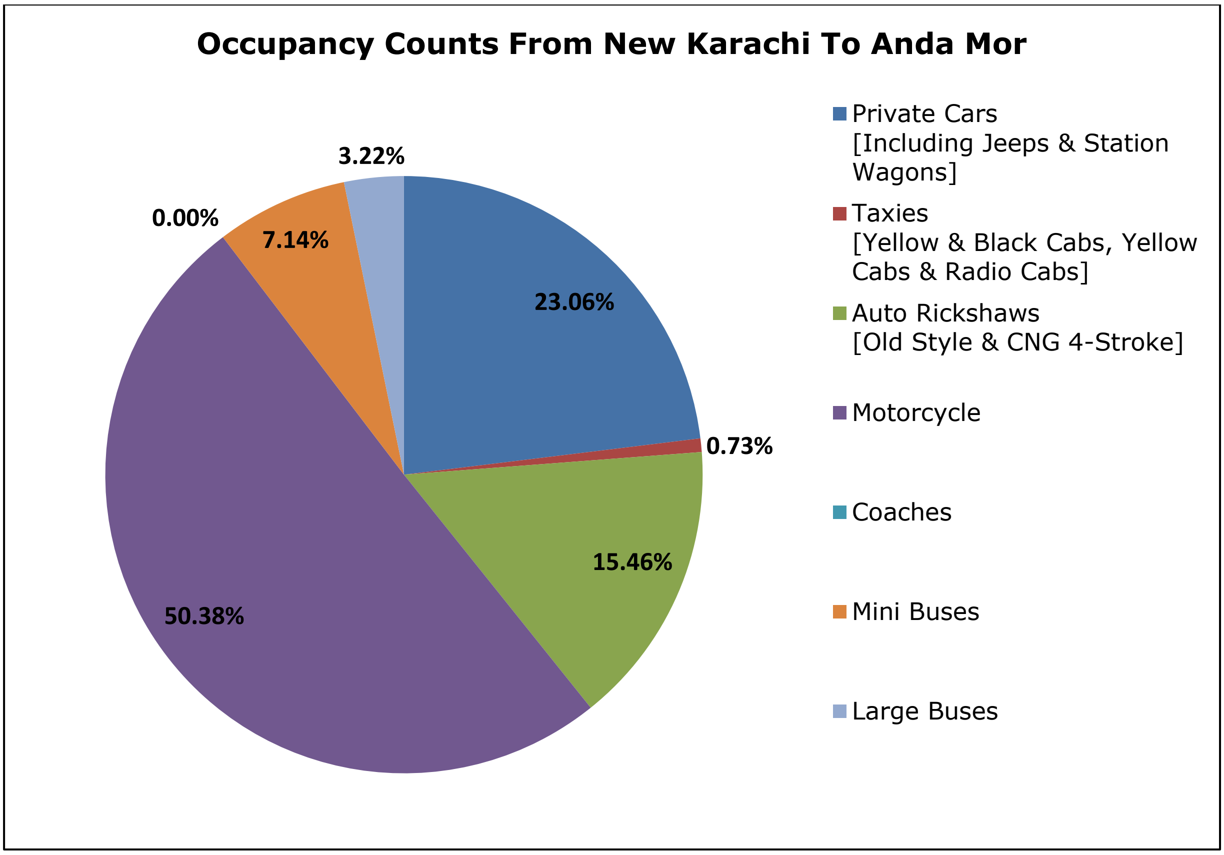


Figure 3.132: Occupancy Counts from New Karachi to Anda Mor (OC-32)

In this area occupancy rate for Motorcycles is very high around 50% passengers counts in single direction from New Karachi to Anda Mor. Private cars are the second highest which makes around 23%. Para Transit is 16% occupant. Public Transport makes fewer shares around 10%.

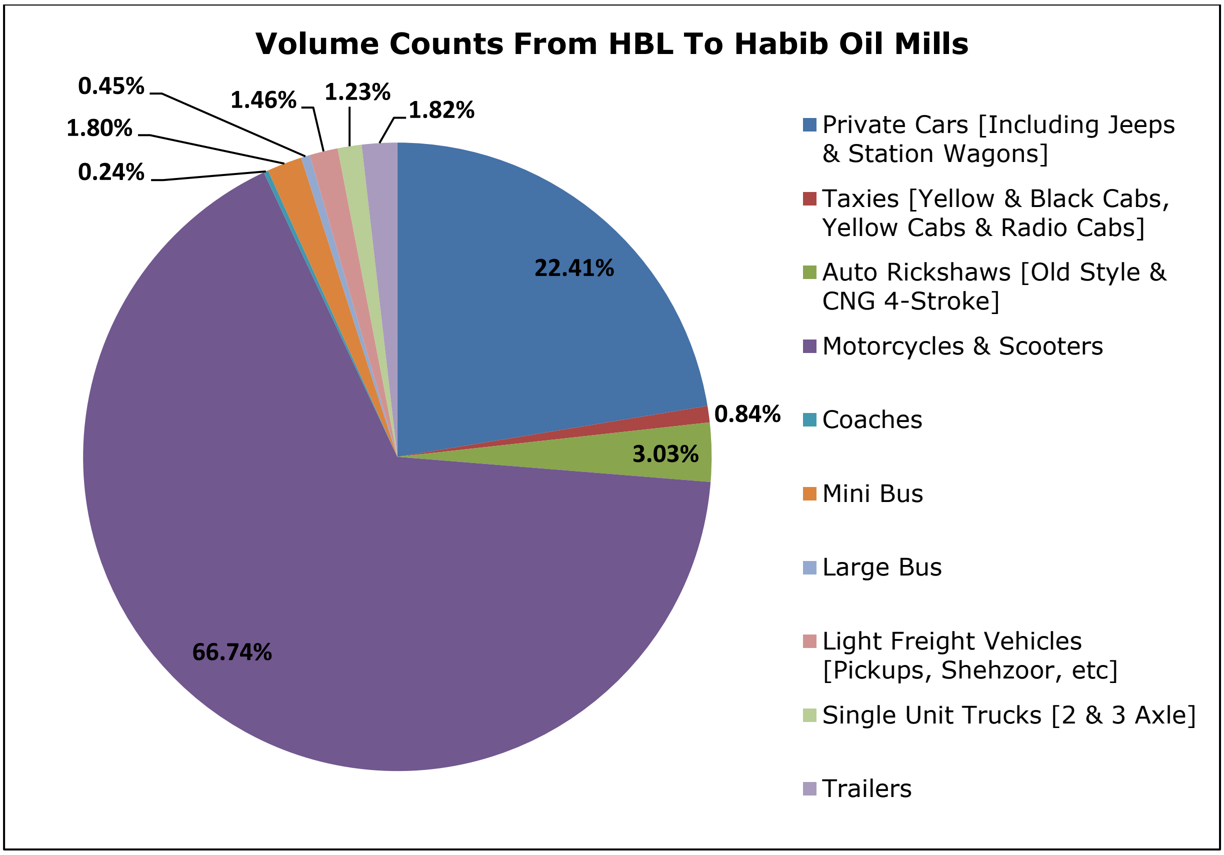


Figure 3.133: Volume Counts from HBL to Habib Oil Mills (VC-33)

Motor Cycles and Private cars are predominant mode of transport even in this segment the total modal split 66.74% and 22.41% share respectively. Other major modes in this area are Para Transit which constitutes around 4%. Rest of the Public Transport and Freight Vehicles have 7% of the total modal share.

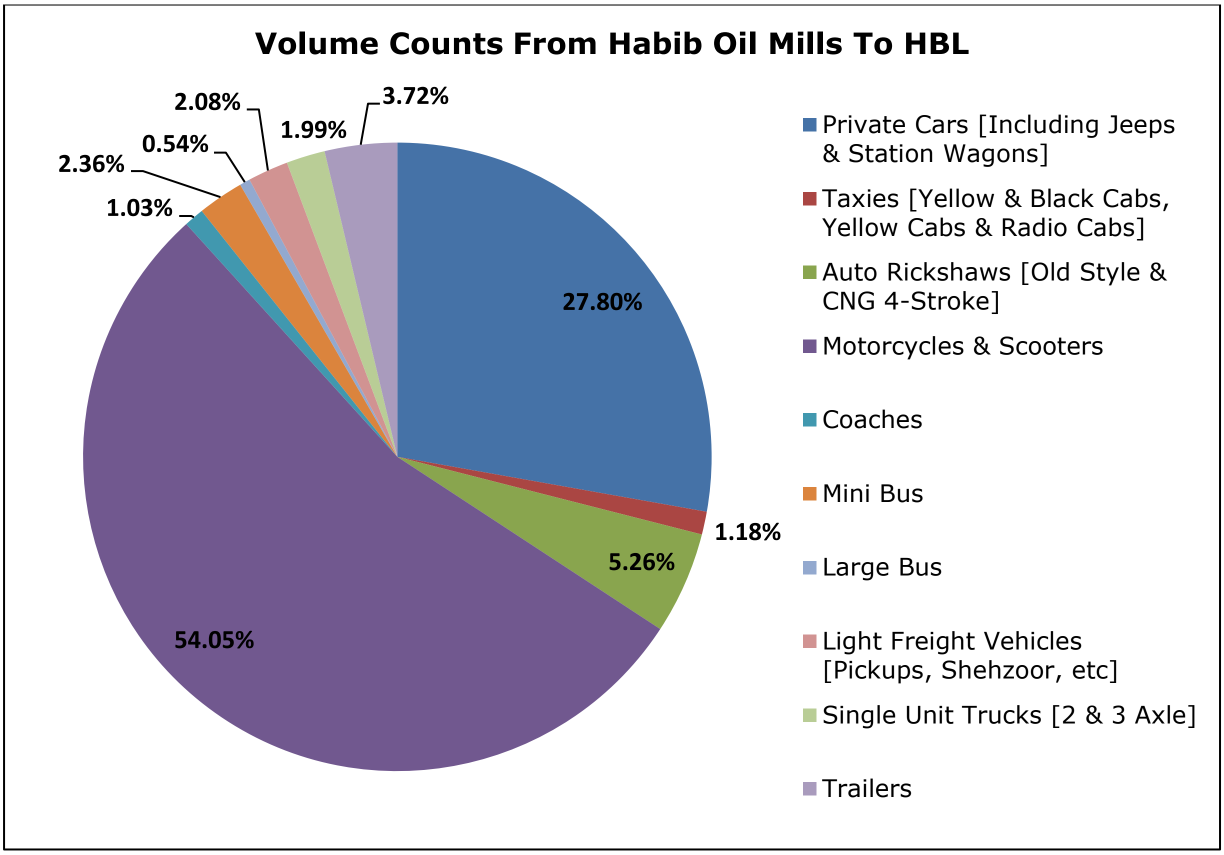


Figure 3.134: Volume Counts from Habib Oil Mills to HBL (VC-33)

Motor Cycles and Private cars are predominant mode of transport even in this segment the total modal split 54.05% and 27.80% share respectively. Other major modes in this area are Para Transit which constitutes around 6%. Rest of the Public Transport and Freight Vehicles have 11% of the total modal share.

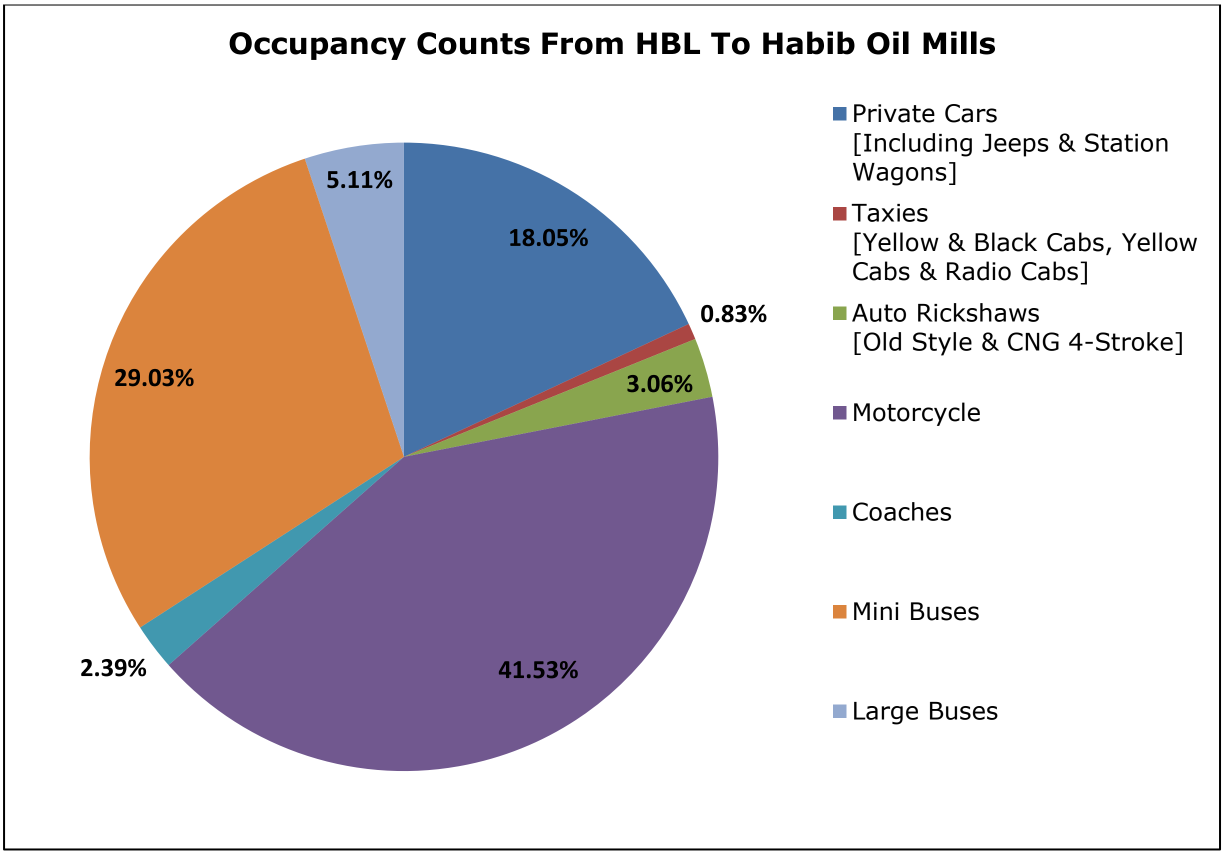


Figure 3.135: Occupancy Counts from HBL to Habib Oil Mills (OC-33)

In this area occupancy rate for Motorcycles is very high around 41% passengers counts in single direction from HBL to Habib Oil Mills. Public Transport is the second highest which makes around 36%. Private cars are 18% occupant. Para Transit makes fewer shares around 4%.

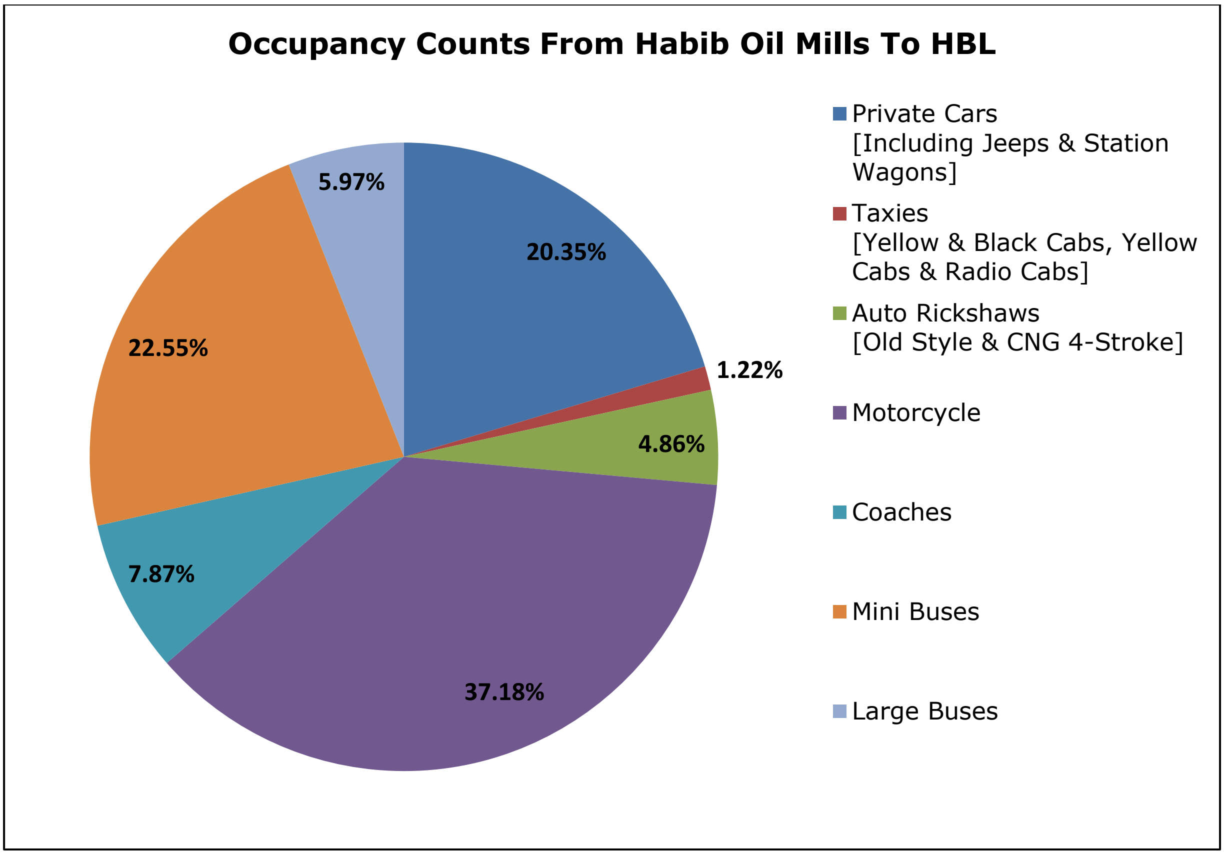


Figure 3.136: Occupancy Counts from Habib Oil Mills to HBL (OC-33)

In this area occupancy rate for Motorcycles is very high around 37% passengers counts in single direction from Habib Oil Mills to HBL. Public Transport is the second highest which makes around 36%. Private cars are 20% occupant. Para Transit makes fewer shares around 5%.

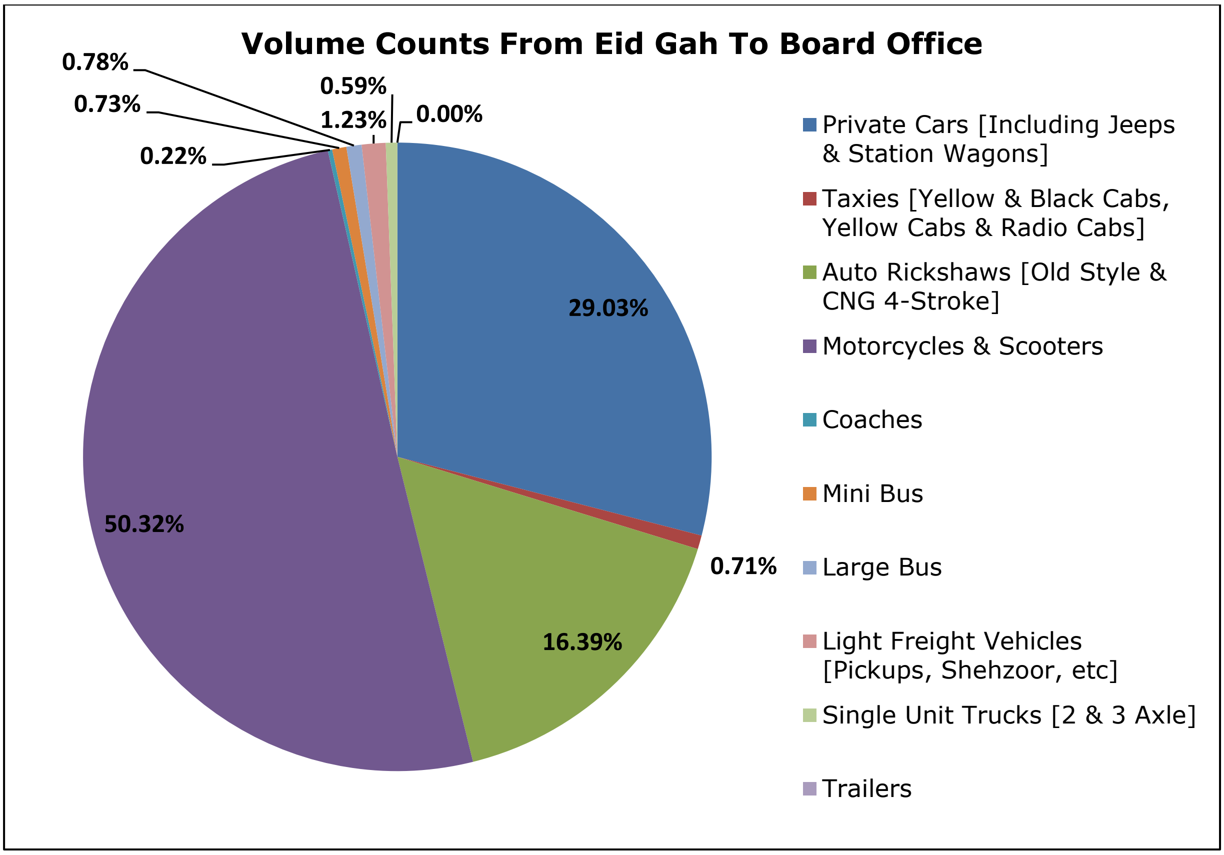


Figure 3.137: Volume Counts from Eid Gah to Board Office (VC-34)

Private Cars and Motor Cycles are predominant mode of transport even in this segment as they sum up to around 79.35% of the total modal split with 29.03% and 50.32% share respectively. Other major modes in this area are Para transit which constitutes around 17% also Public Transport Consists 3% vehicular traffic share and Freight Vehicles are 2% of the total modal share.

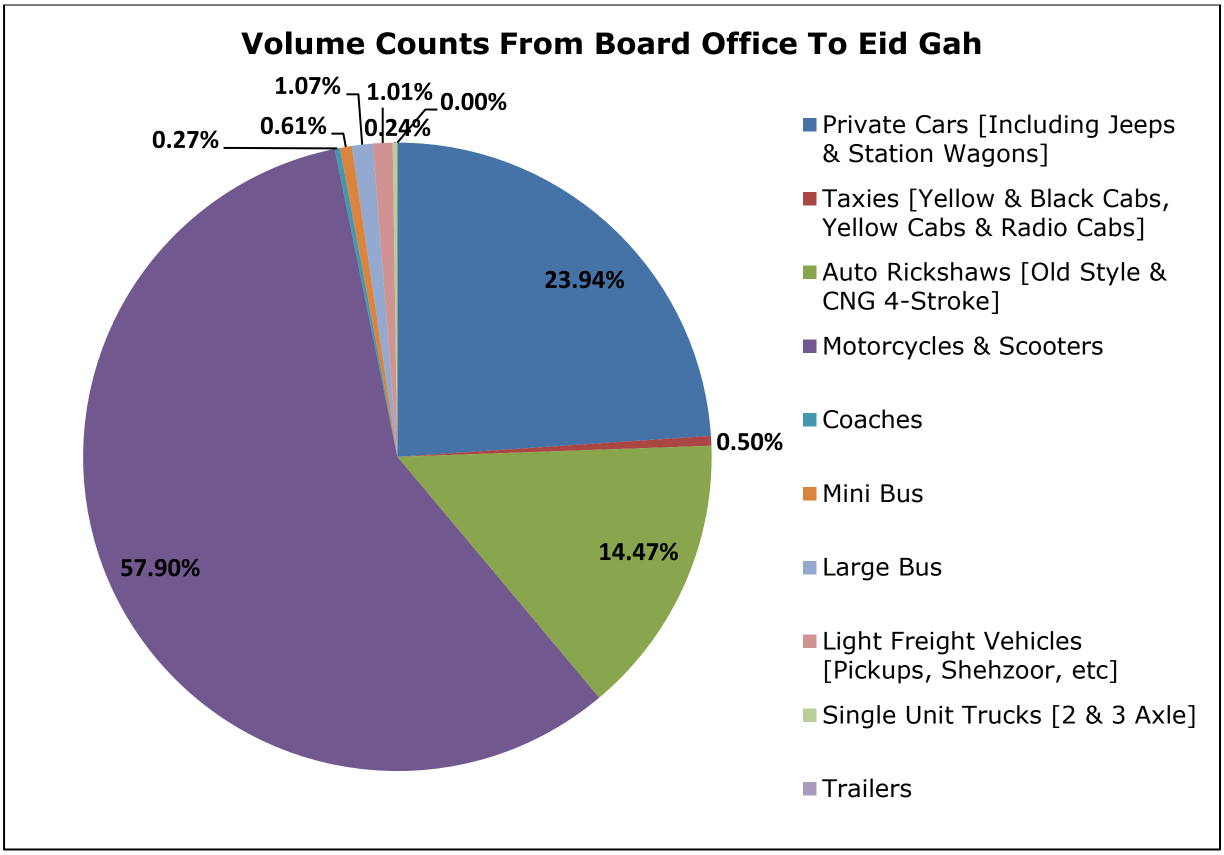


Figure 3.138: Volume Counts from Board Office to Eid Gah (VC-34)

Private Cars and Motor Cycles are predominant mode of transport even in this segment as they sum up to around 82% of the total modal split with 23.94% and 57.90% share respectively. Other major modes in this area are Para transit which constitutes around 15% also Public Transport Consists 2% vehicular traffic share and Freight Vehicles are 1% of the total modal share.

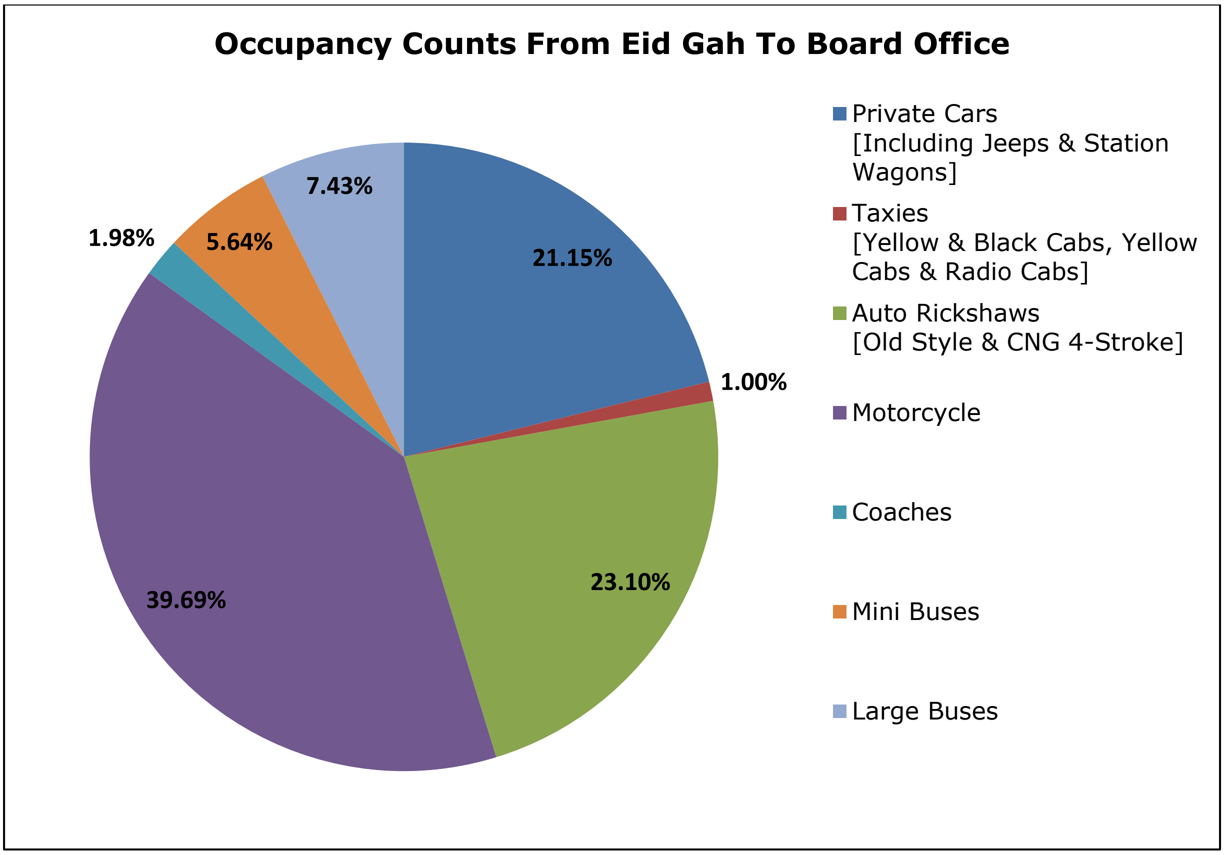


Figure 3.139: Occupancy Counts from Eid Gah to Board Office (OC-34)

In this area occupancy rate for Motorcycles is very high around 40% passengers counts in single direction from Eid Gah to Board office. Para Transit is the second highest which makes around 24%. Private cars are 21% occupant. Public Transport makes fewer shares around 15%.

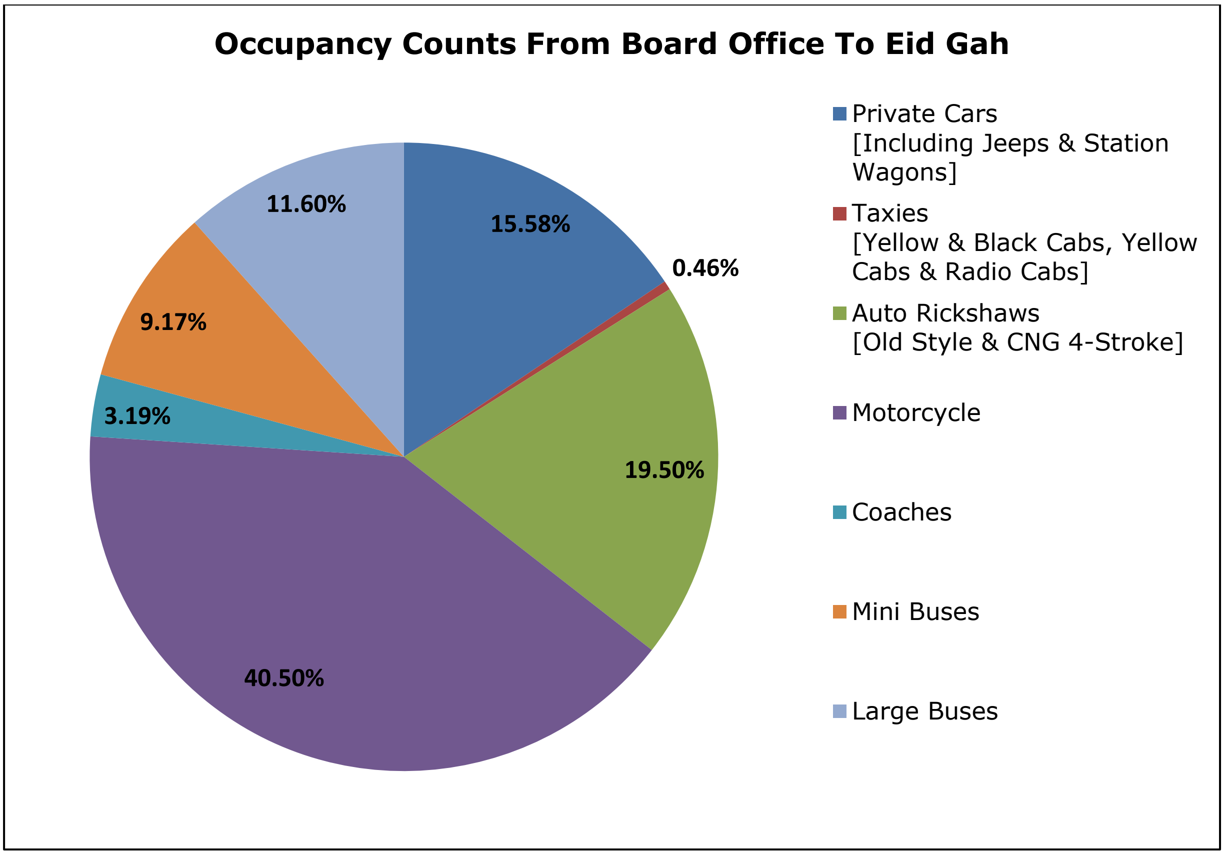


Figure 3.140: Occupancy Counts from Board Office to Eid Gah (OC-34)

In this area occupancy rate for Motorcycles is very high around 40% passengers counts in single direction from Board office to Eid Gah. Public Transport is the second highest which makes around 24%. Para Transit is 20% occupant. Private cars make fewer shares around 15%.

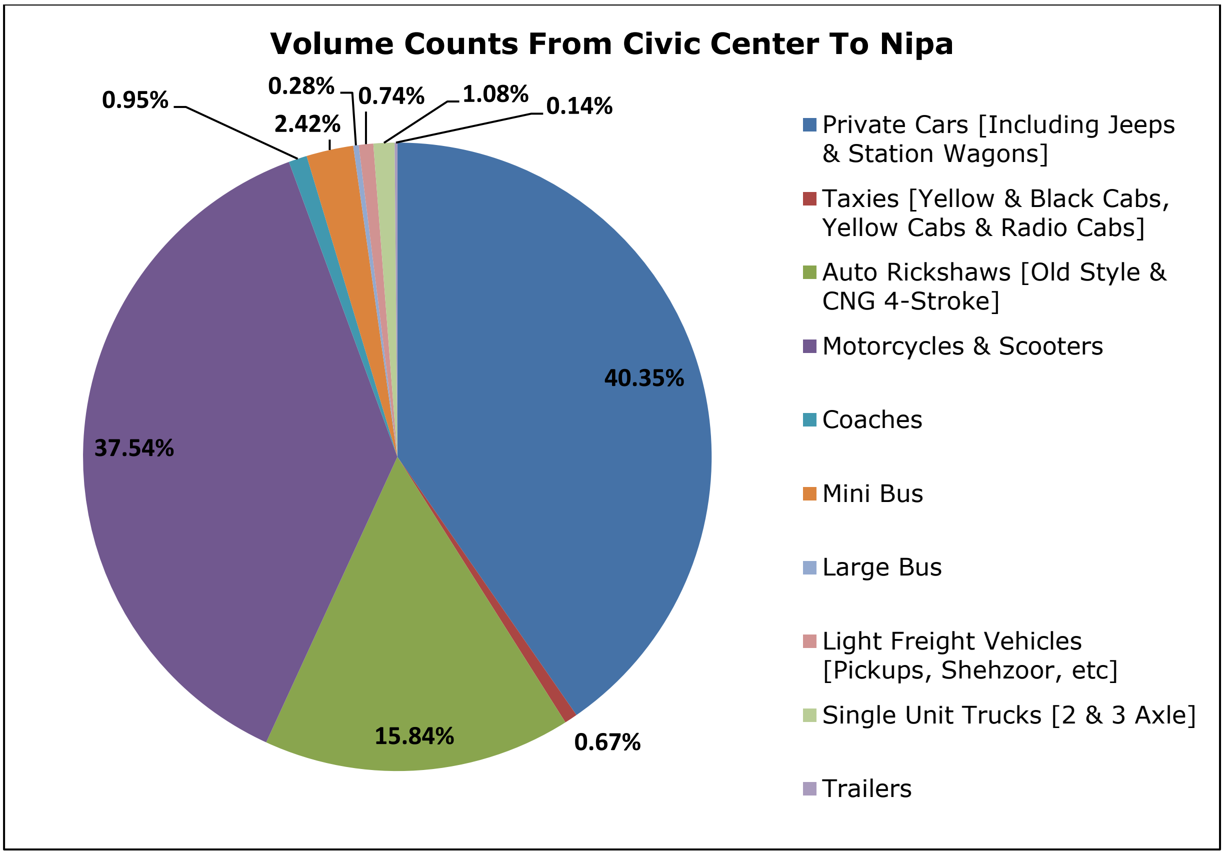


Figure 3.141: Volume Counts from Civic Center to Nipa (Weekday) - (VC-35)

On Average Weekday, Private Cars constitute the largest vehicle share with 40.35%, followed by Motorcycles with 37.54%. Para Transit includes Taxies and Rickshaws share in the total vehicle fleet is high at 17%. Rest of the modal distribution consists of Freight Vehicles is less than 2% and Public Transport includes Coaches, Mini Bus and Large bus have 4%.

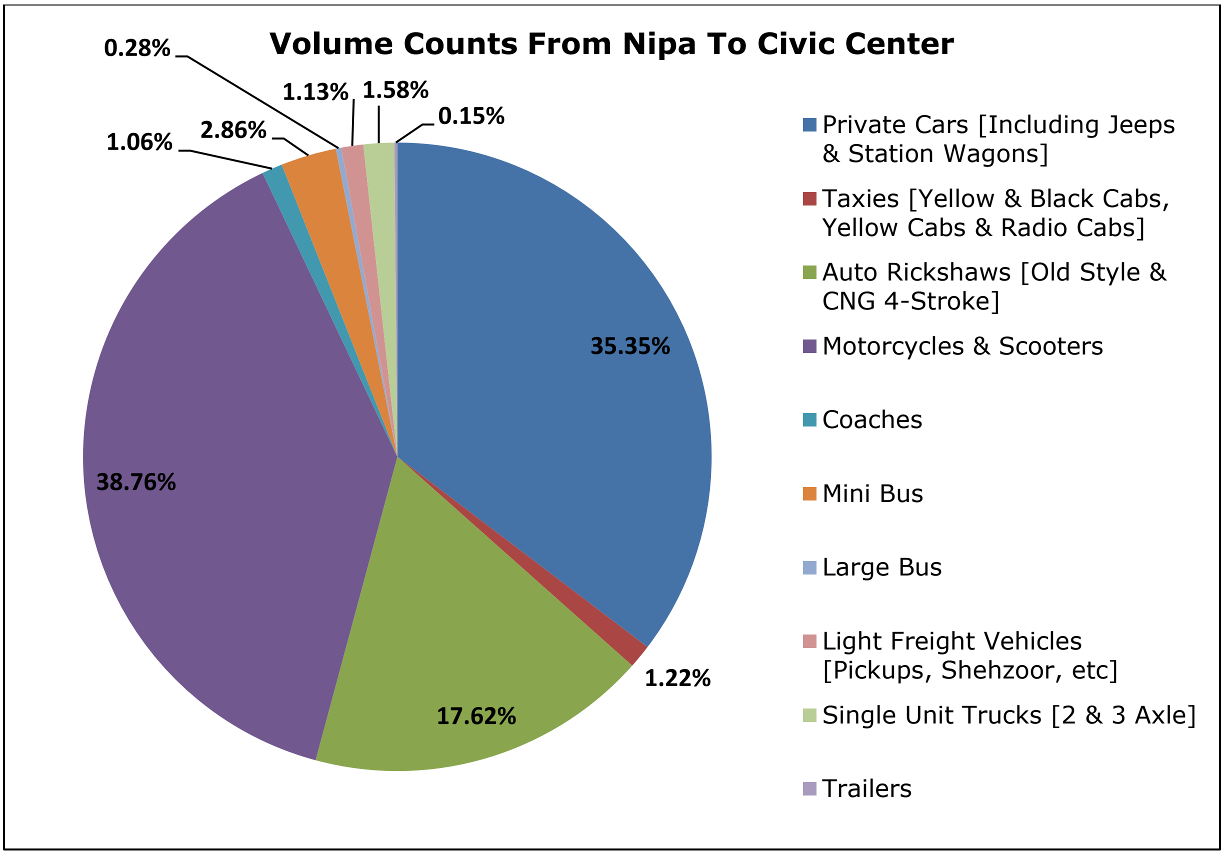


Figure 3.142: Volume Counts from Nipa to Civic Center (Weekday) - (VC-35)

On Average Weekday, Motorcycles constitute the largest vehicle share with 38.76%, followed by Private Cars with 35.35%. Para Transit includes Taxies and Rickshaws share in the total vehicle fleet is high at 19%. Rest of the modal distribution consists of Freight Vehicles is less than 2% and Public Transport includes Coaches, Mini Bus and Large bus have 4%.

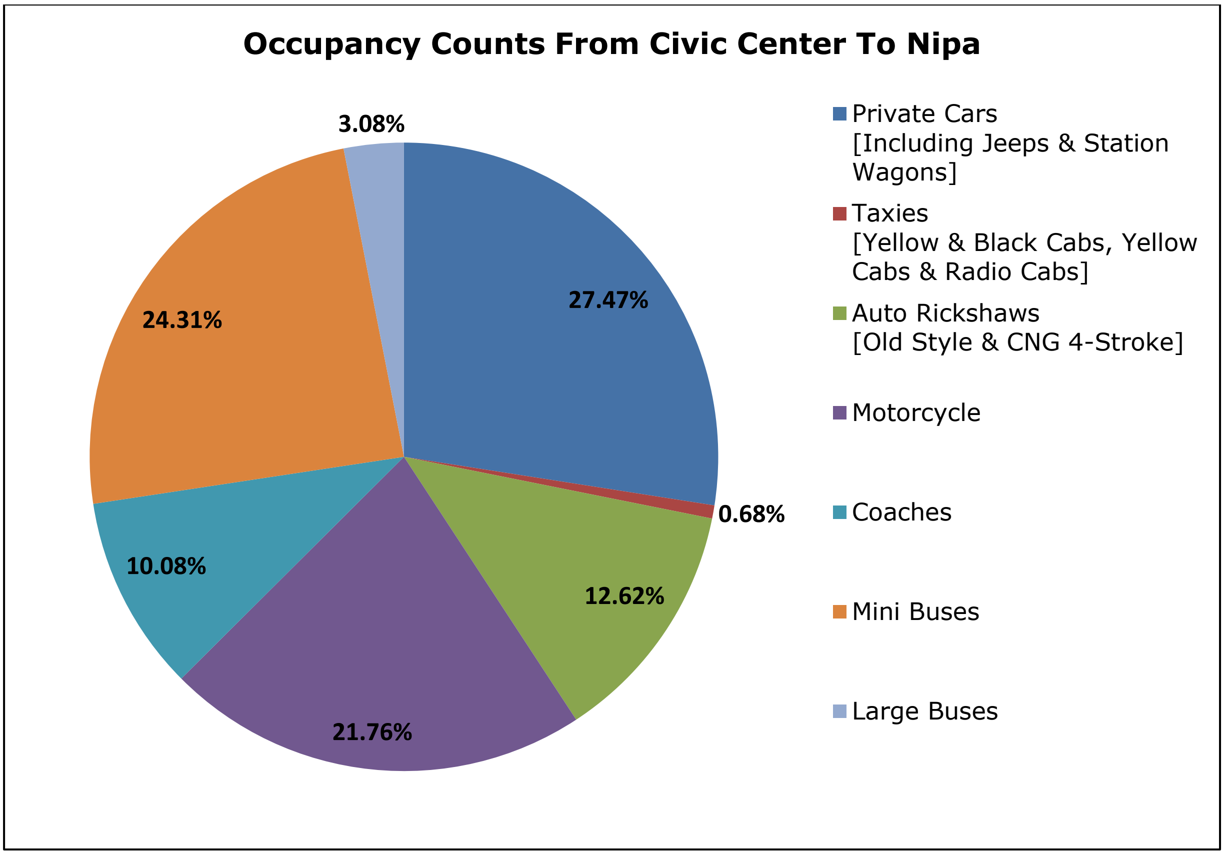


Figure 3.143: Occupancy Counts from Civic Center to Nipa (Weekday) - (OC-35)

In Average Weekday, In this area occupancy rate for Public Transport is very high around 38% passengers counts in single direction from Civic Center to Nipa. Private cars are the second highest which makes around 27.4%. Motorcycles make share around 21.7%. Para transit is 14% occupant.

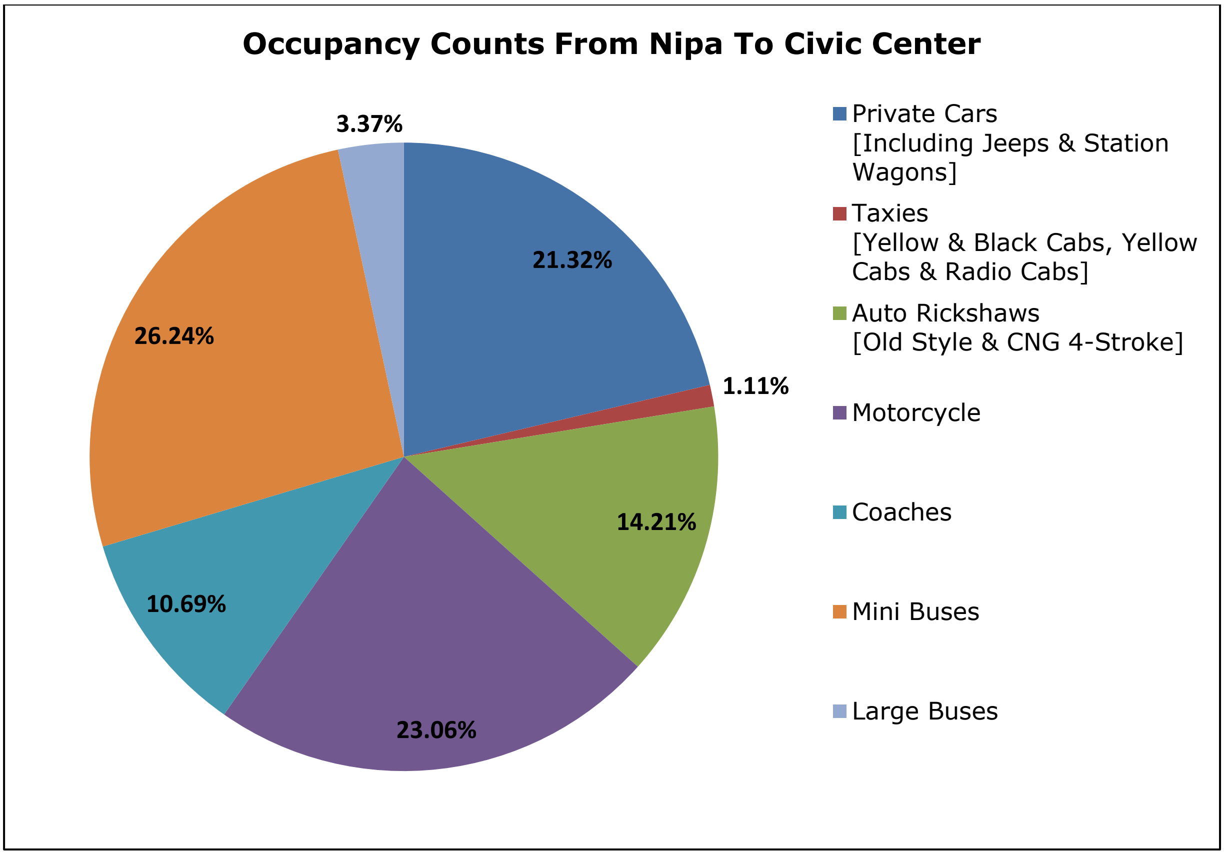


Figure 3.144: Occupancy Counts Nipa to Civic Center (Weekday) - (OC-35)

In Average Weekday, in this area occupancy rate for Public Transport is very high around 40% passengers counts in single direction from Nipa to Civic Center. Motorcycles are the second highest which makes around 23.06%. Private cars make share around 21.32%. Para transit is 15% occupant.

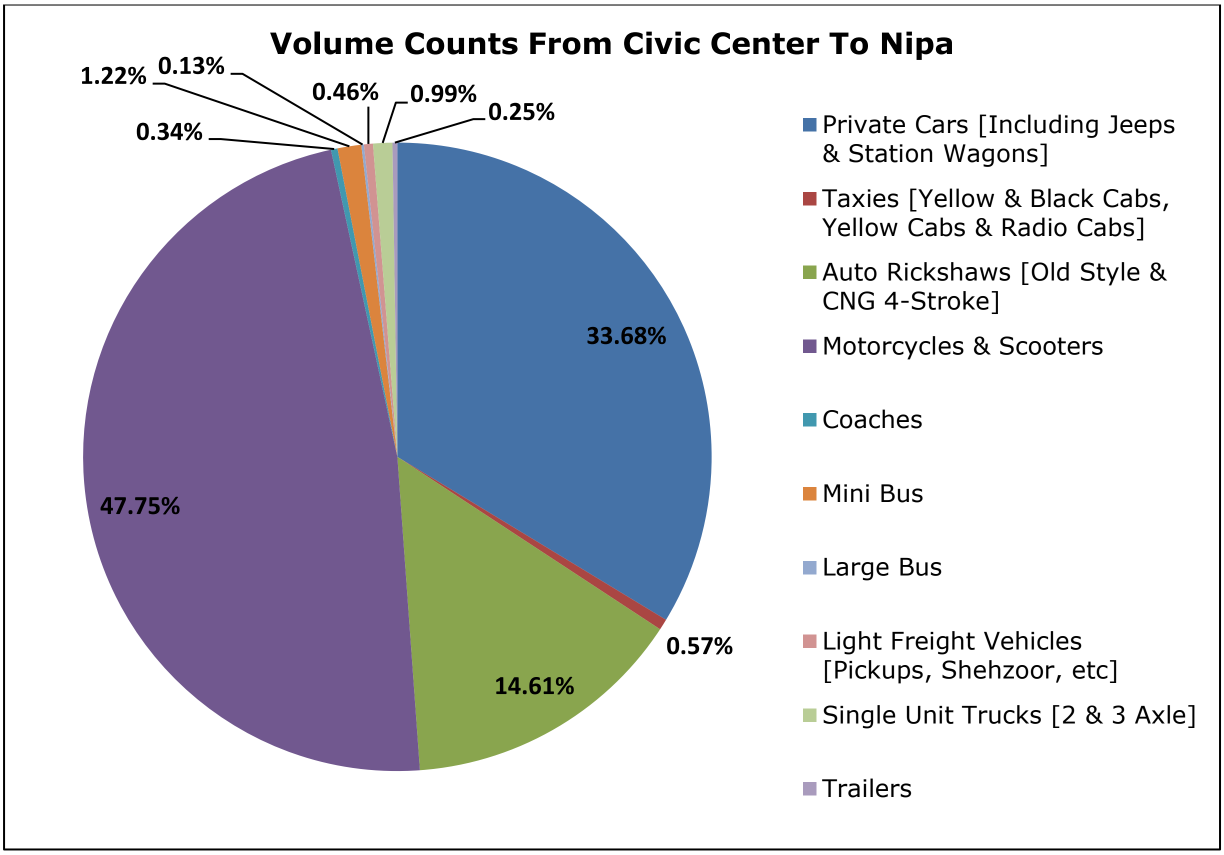


Figure 3.145: Volume Counts from Civic Center to Nipa (Weekend) - (VC-35)

On Average Weekend, Motorcycles constitute the largest vehicle share with 47.75%, followed by Private Cars with 33.68%. Para Transit includes Taxies and Rickshaws share in the total vehicle fleet is high at 16%. Rest of the modal distribution consists of Freight Vehicles is less than 2% and Public Transport includes Coaches, Mini Bus and Large bus have also 2%.

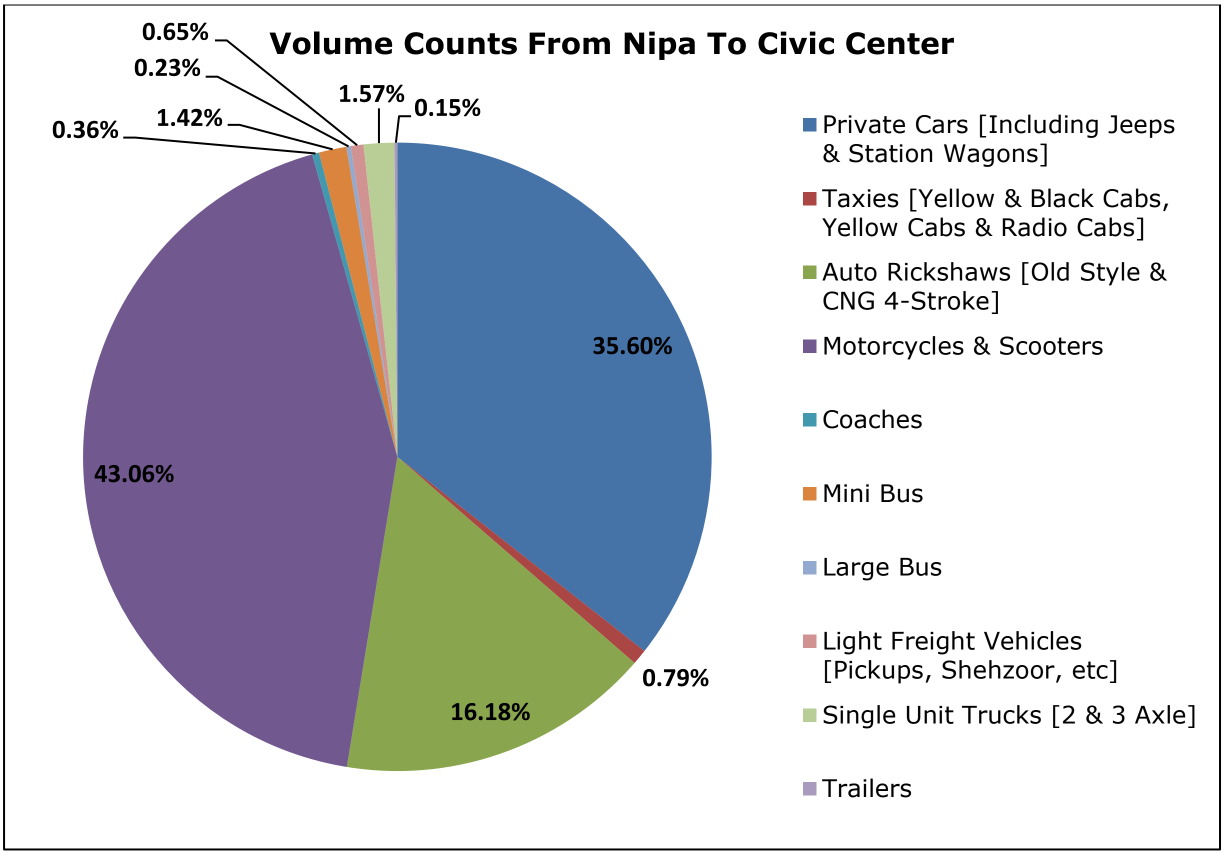


Figure 3.146: Volume Counts from Nipa to Civic Center (Weekend) - (VC-35)

On Average Weekend, Motorcycles constitute the largest vehicle share with 43.06%, followed by Private Cars with 35.60%. Para Transit includes Taxies and Rickshaws share in the total vehicle fleet is high at 17%. Rest of the modal distribution consists of Freight Vehicles is less than 2% and Public Transport includes Coaches, Mini Bus and Large bus have also 2%.

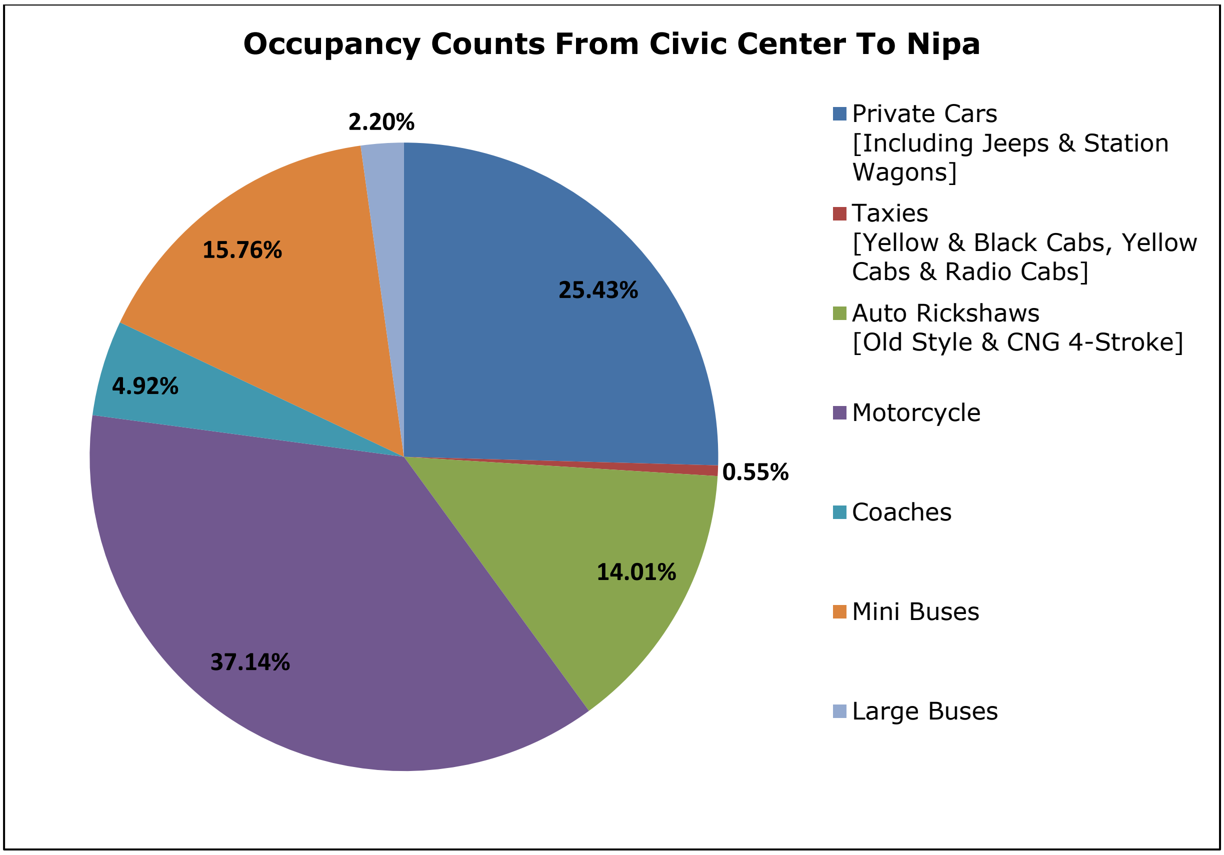


Figure 3.147: Occupancy Counts from Civic Center to Nipa (Weekend) - (OC-35)

In Average Weekend, in this area occupancy rate for Motorcycles is very high around 37.4% passengers counts in single direction from Civic Center to Nipa. Public Transport is the second highest which makes around 22.8%. Private cars make share around 25.4%. Para transit is 15% occupant.

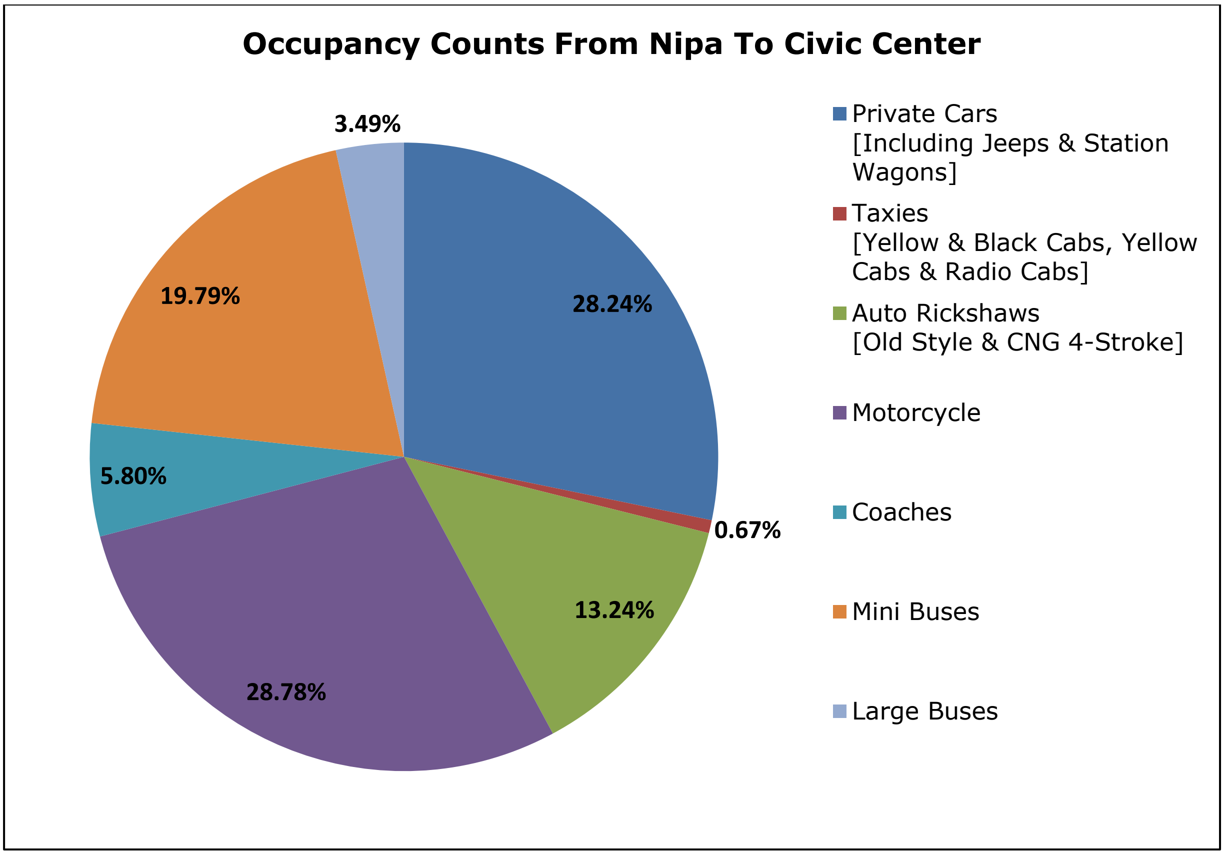


Figure 3.148: Occupancy Counts Nipa to Civic Center (Weekend) - (OC-35)

In Average Weekend, in this area occupancy rate for Public Transport is very high around 29% passengers counts in single direction from Nipa to Civic Center. Motorcycles are the second highest which makes around 29%. Private cars make share around 28%. Para transit is 14% occupant.

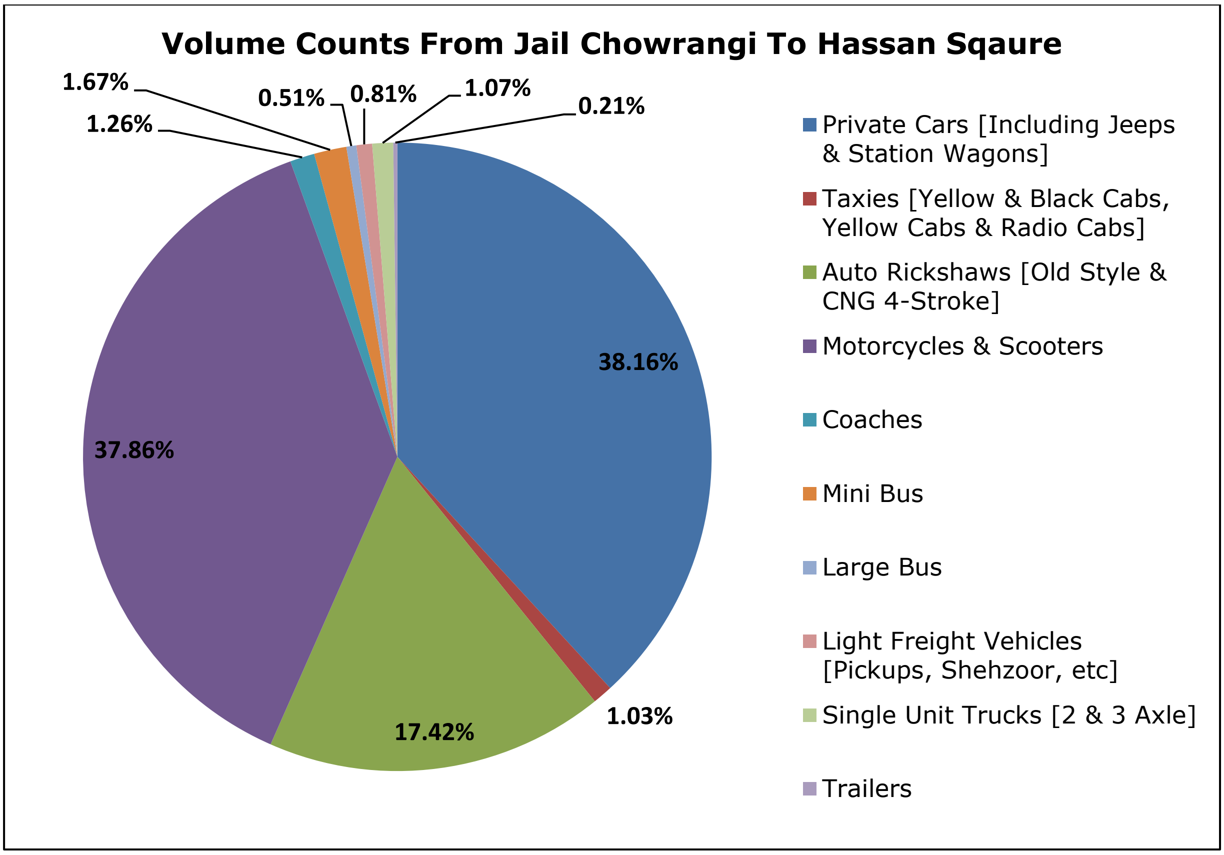


Figure 3.149: Volume Share from Jail Chowrangi to Hassan Square (VC-36)

Private Cars and Motor Cycles are predominant mode of transport even in this segment as they sum up to around 76.02% of the total modal split with 38.16% and 37.86% share respectively. Other major modes in this area are Para transit which constitutes around 18.45% also Public Transport Consists 3% vehicular traffic share and Freight Vehicles are 2% of the total modal share.

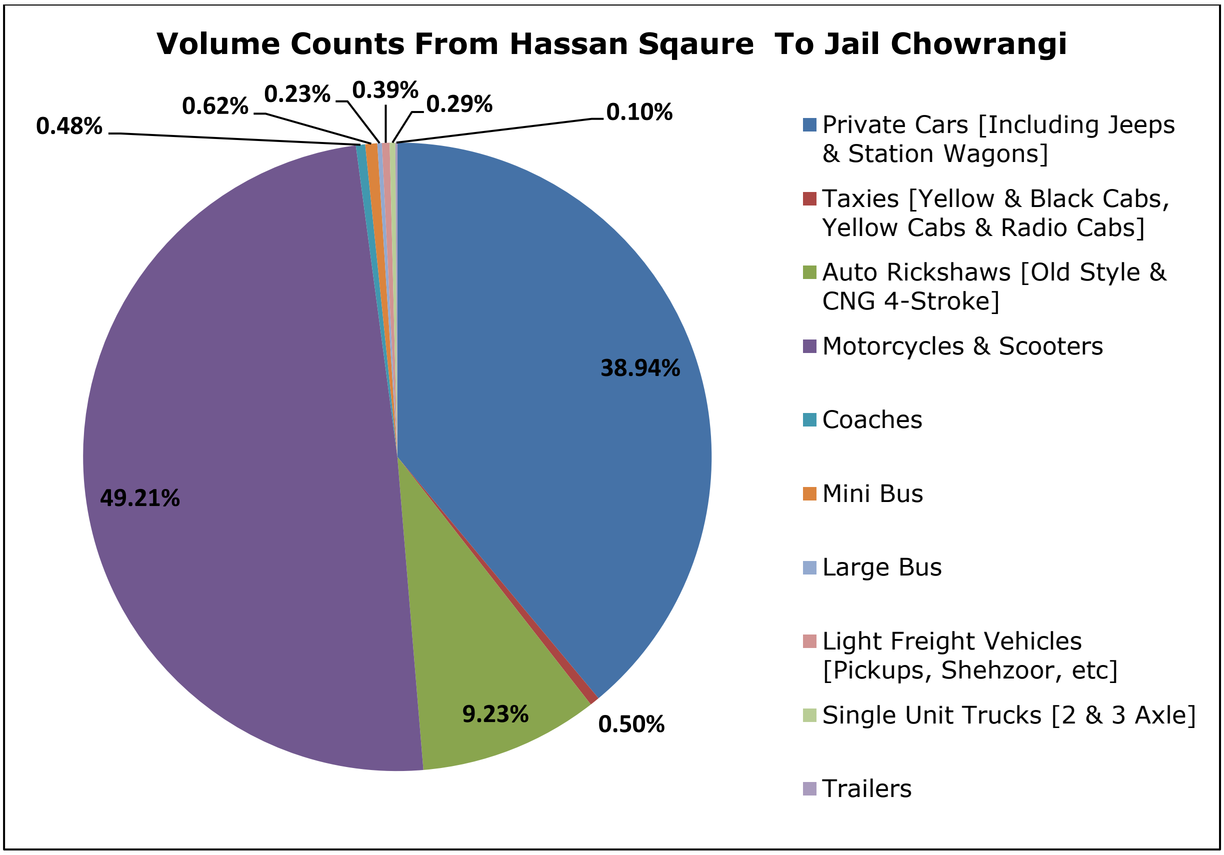


Figure 3.150: Volume Share from Hassan Square to Jail Chowrangi (VC-36)

Private Cars and Motor Cycles are predominant mode of transport even in this segment as they sum up to around 87% of the total modal split with 38.9% and 49.2% share respectively. Other major modes in this area are Paratransit which constitutes around 10% also Public Transport Consists 2% vehicular traffic share and Freight Vehicles are less than 1% of the total modal share.

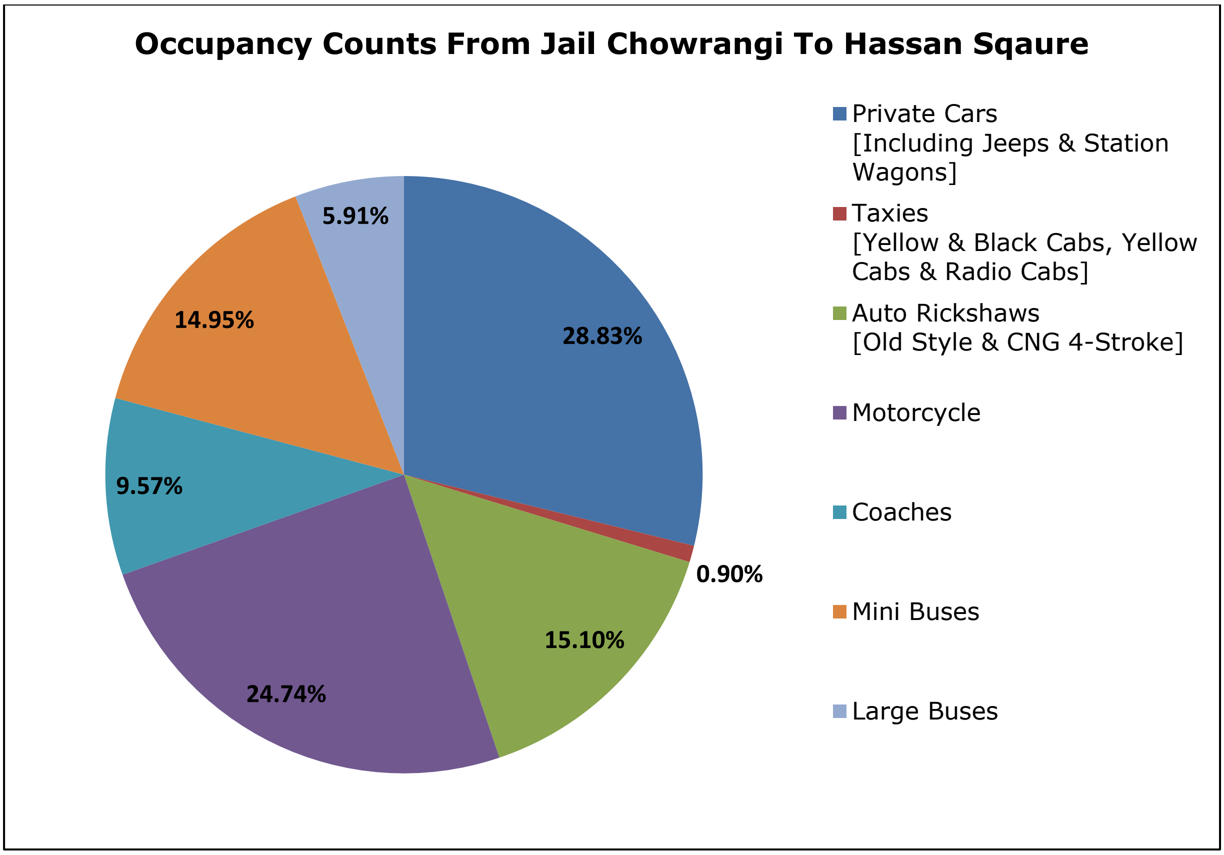


Figure 3.151: Occupancy Counts from Jail Chowrangi to Hassan Square (OC-36)

In this area occupancy rate for Public Transport is very high around 30% passengers counts in single direction from Jail Chowrangi to Hassan Square. Private cars are the second highest which makes around 28%. Motorcycles are 25% occupant. Para Transit makes fewer shares around 16%.

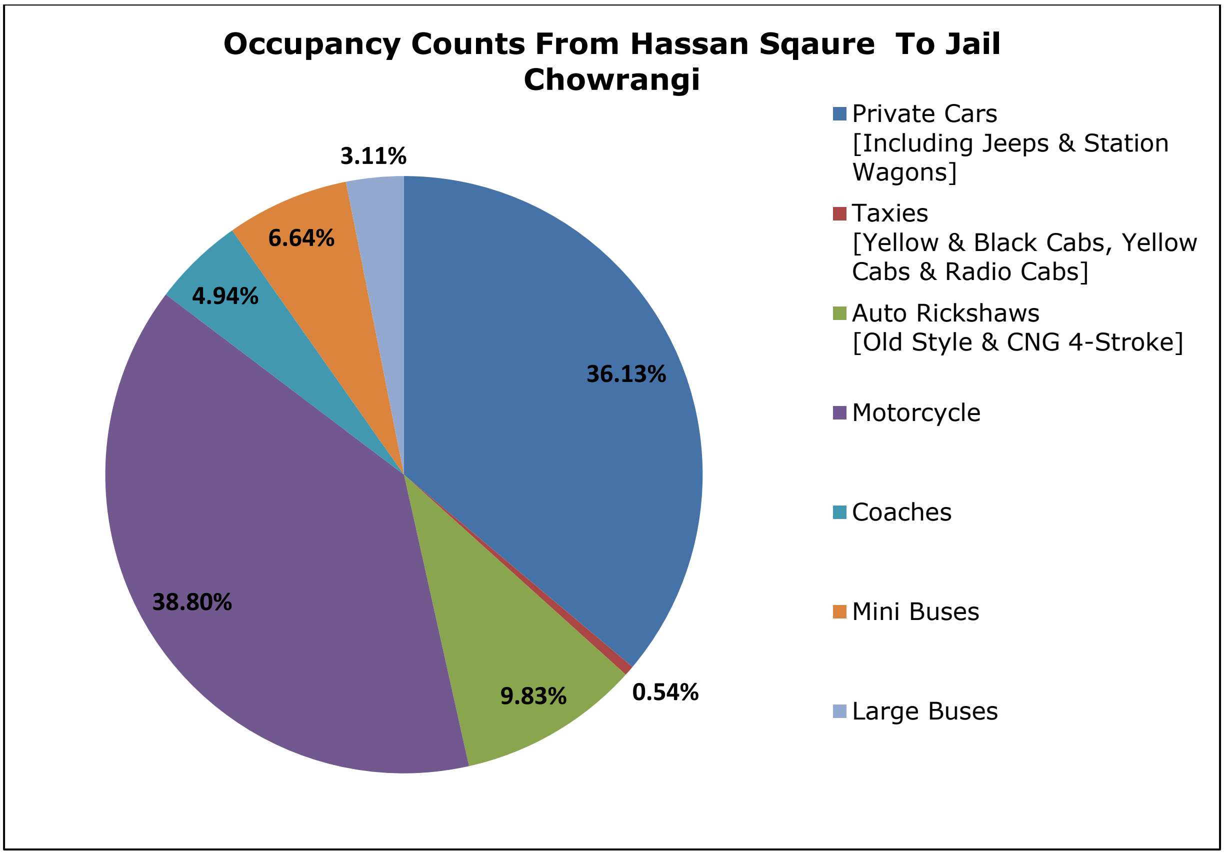


Figure 3.152: Occupancy Counts from Hassan Square to Jail Chowrangi (OC-36)

In this area occupancy rate for Motorcycles is very high around 38% passengers counts in single direction from Hassan Square to Jail Chowrangi. Private cars are the second highest which makes around 36%. Public Transport is 14% occupant. Para Transit makes fewer shares around 10%.

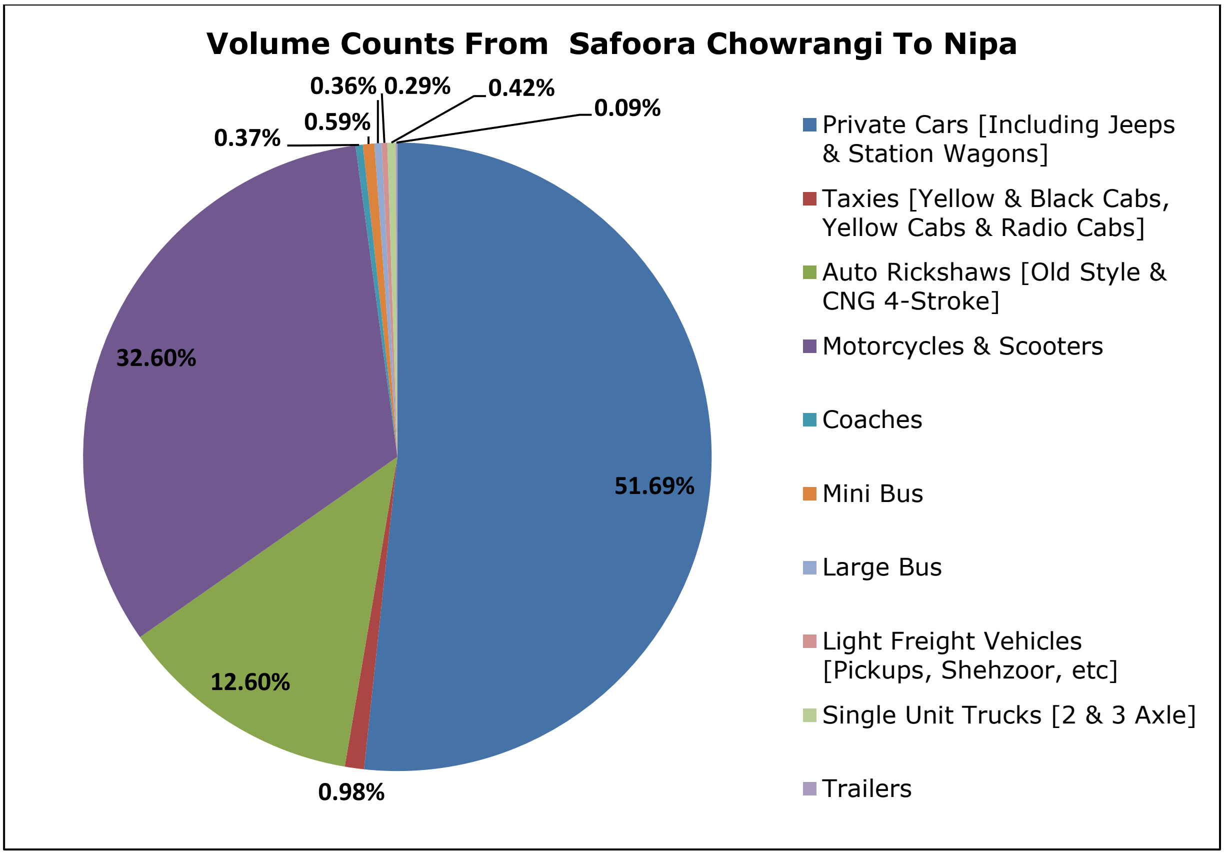


Figure 3.153: Volume Counts from Safoora Chowrangi to Nipa (VC-37)

Private Cars and Motor Cycles are predominant mode of transport even in this segment as they sum up to around 84.29% of the total modal split with 51.69% and 32.60% share respectively. Other major modes in this area are Para transit which constitutes around 13.58% also Public Transport Consists 1.32% vehicular traffic share and Freight Vehicles are less than 1% of the total modal share.

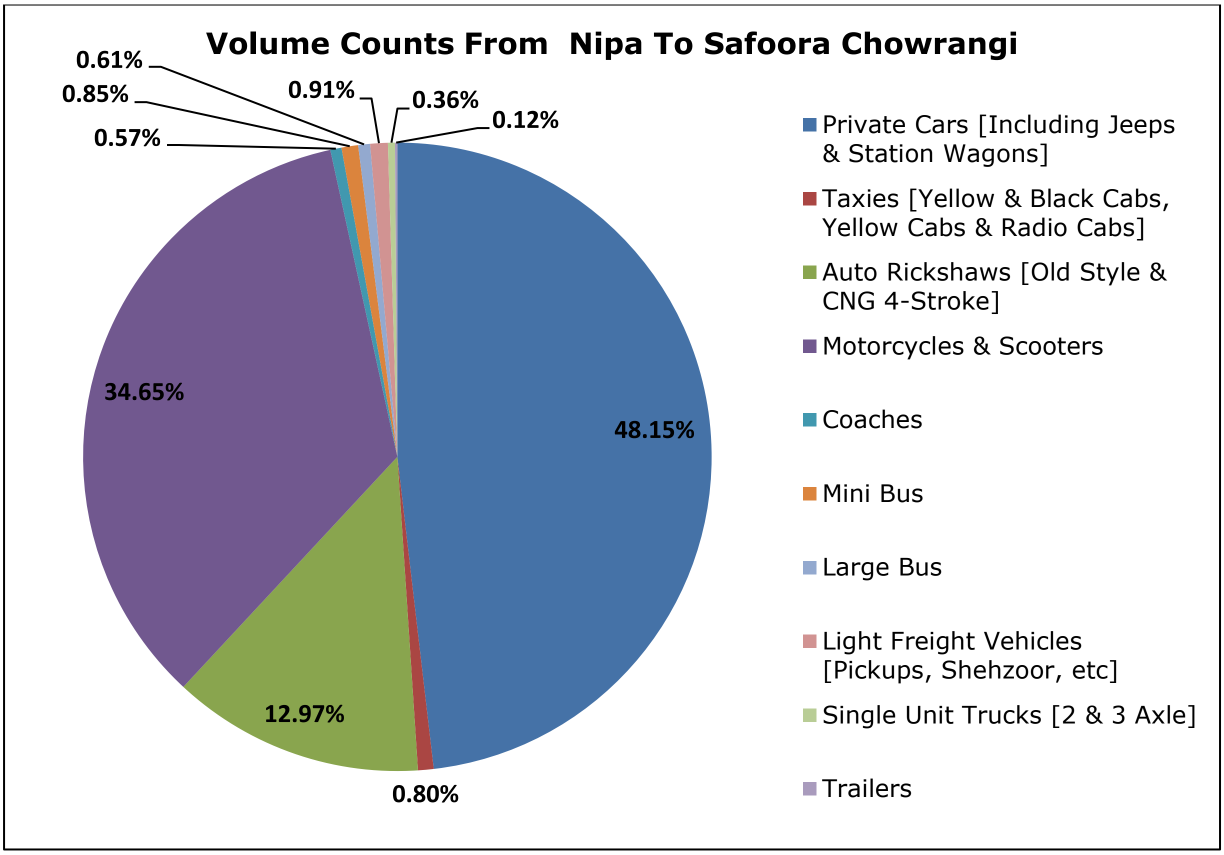


Figure 3.154: Volume Counts from Nipa to Safoora Chowrangi (VC-37)

Private Cars and Motor Cycles are predominant mode of transport even in this segment as they sum up to around 82.8% of the total modal split with 48.15% and 34.65% share respectively. Other major modes in this area are Para transit which constitutes around 13.77% also Public Transport Consists 2.03% vehicular traffic share and Freight Vehicles are 1.39% of the total modal share.

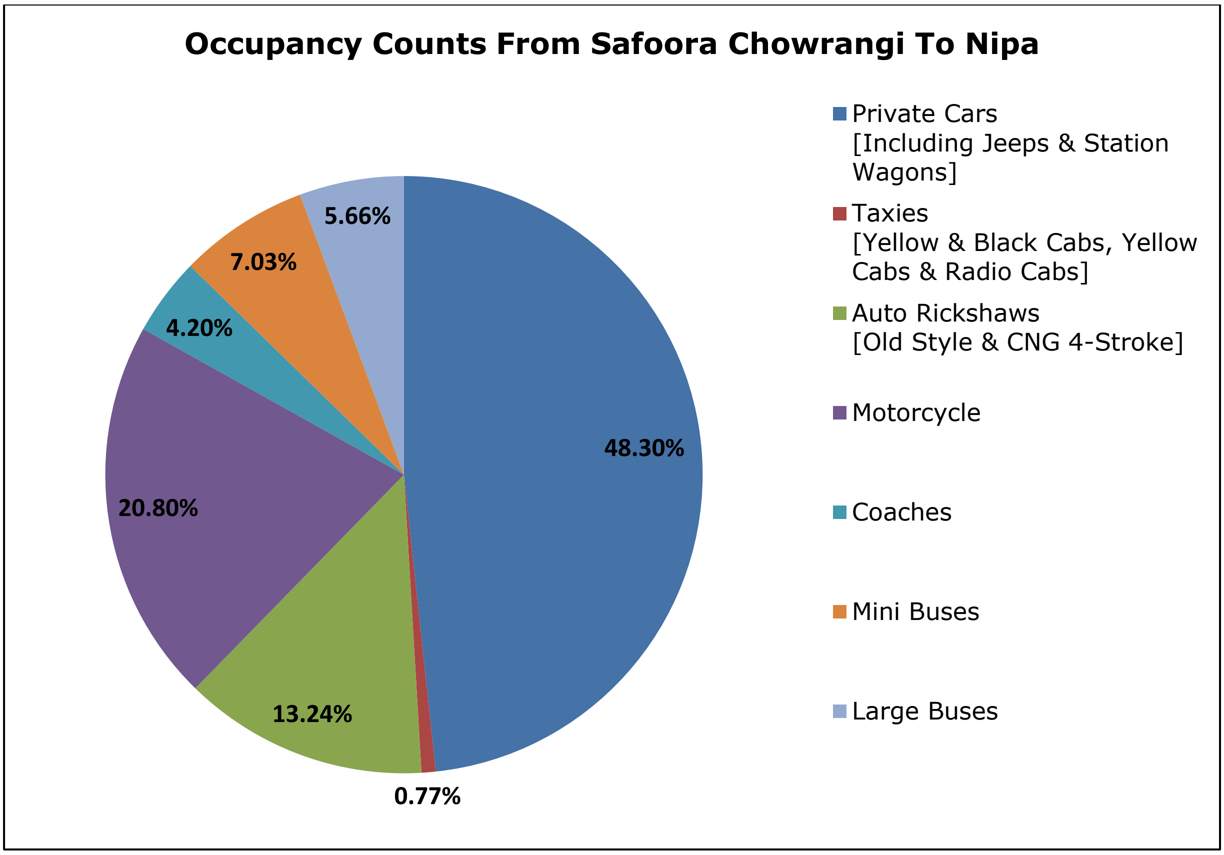


Figure 3.155: Occupancy Counts from Safoora Chowrangi to Nipa (VC-37)

In this area occupancy rate for Private cars is very high around 48% passengers counts in single direction from Safoora Chowrangi to Nipa. Motorcycles are the second highest which makes around 20.80%. Public Transport is 17% occupant. Para Transit makes fewer shares around 14%.

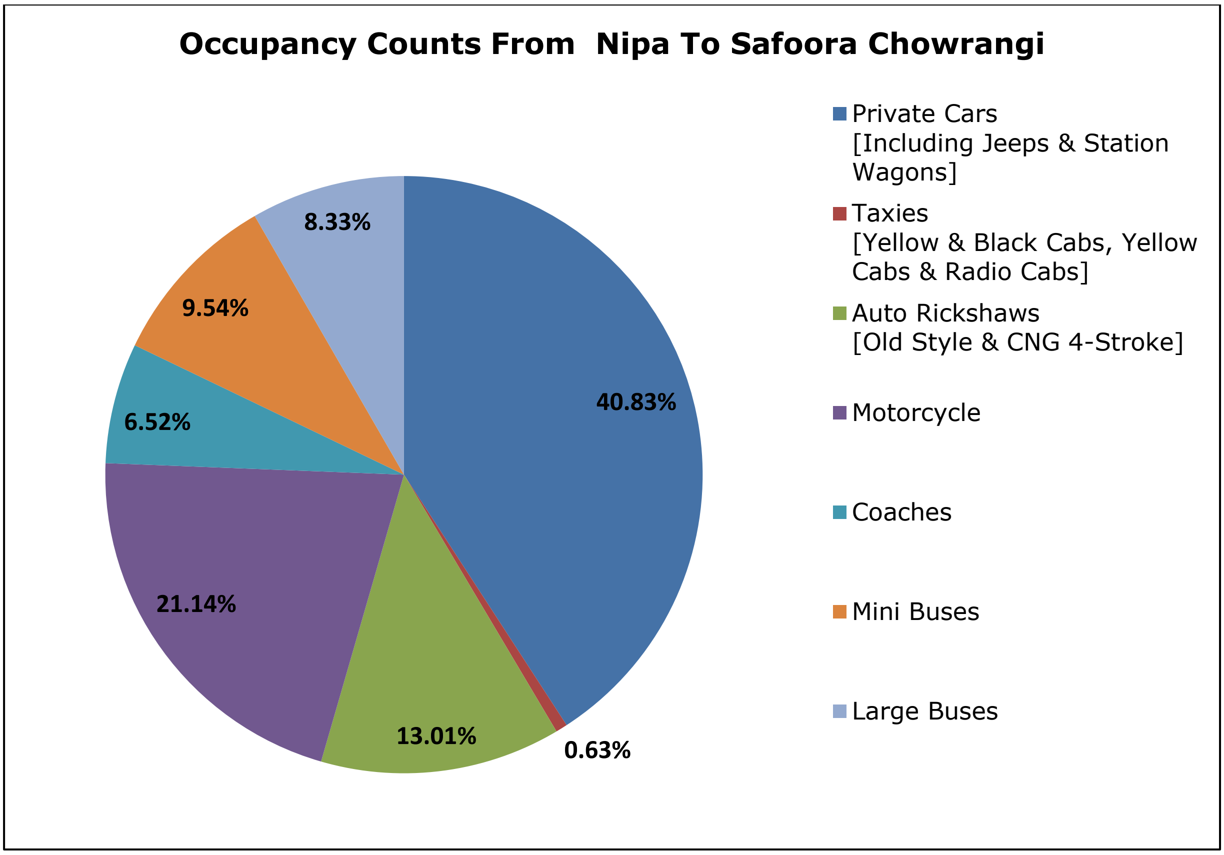


Figure 3.156: Occupancy Counts Nipa to Safoora Chowrangi (OC-37)

In this area occupancy rate for Private cars is very high around 40.83% passengers counts in single direction from Nipa to Safoora Chowrangi. Public Transport is the second highest which makes around 24.39%. Motorcycles are 21.14% occupant. Para Transit makes fewer shares around 14%.

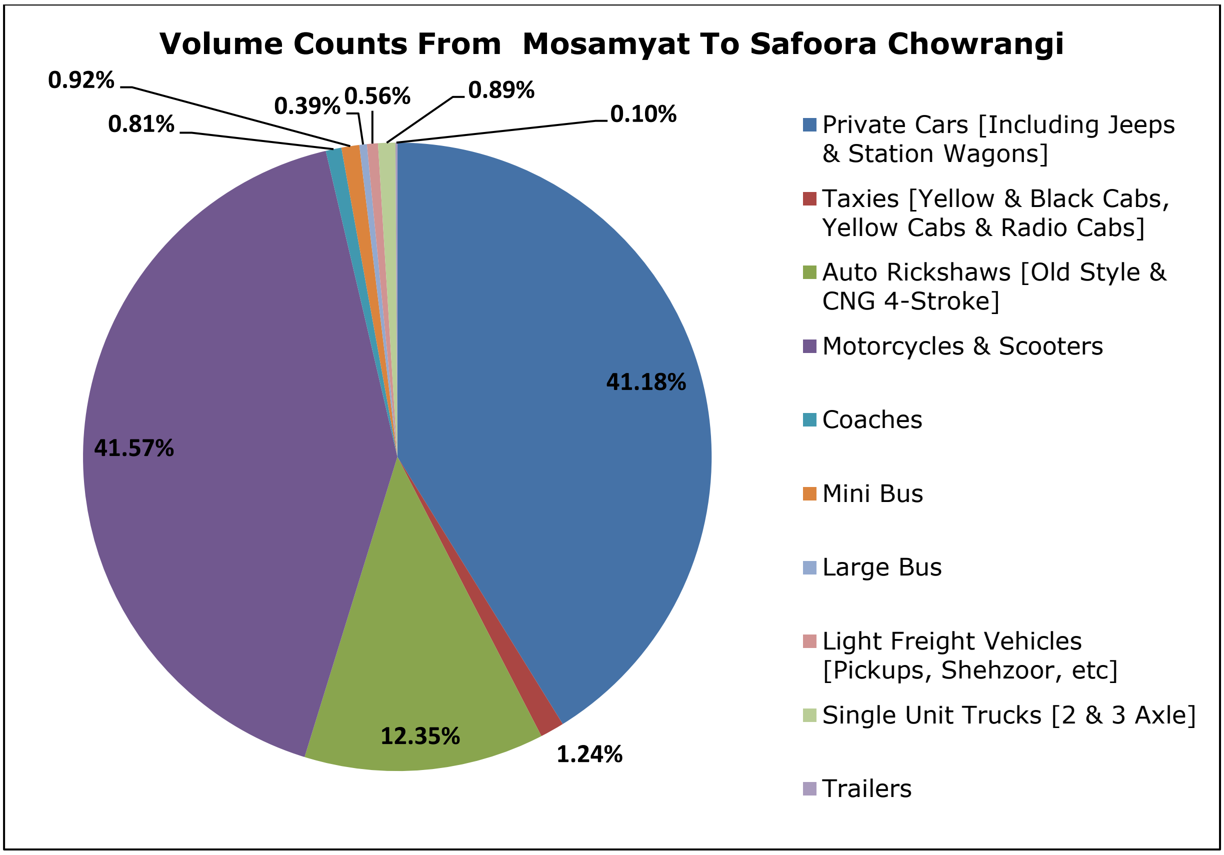


Figure 3.157: Volume Counts from Mosamyat to Safoora Chowrangi (OC-38)

In this segment of Mosamyat to Safoora Chowrangi, Motor Cycles constitutes 41.57%. Among rest of the traffic private cars are predominant having 41.18% modal share whereas rickshaws and taxis constitutes almost 13%, Public Transport constitutes almost 2.12% and freight vehicles are 1.55%.

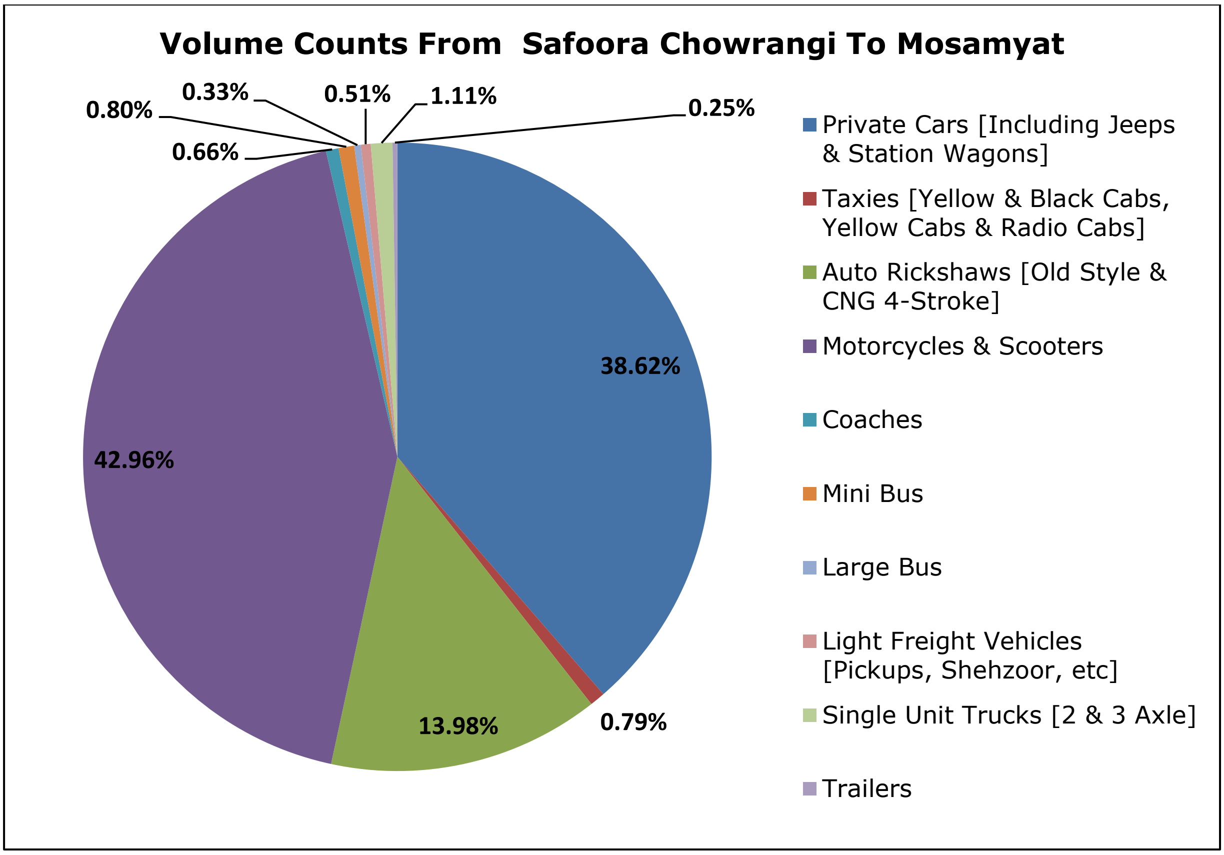


Figure 3.158: Volume Counts from Safoora Chowrangi to Mosamyat (VC-38)

In this segment of Safoora Chowrangi to Mosamyat, Motor Cycles constitutes 42.96%. Among rest of the traffic private cars are predominant having 38.6% modal share whereas rickshaws and taxis constitutes almost 15%, Public Transport constitutes almost 2% and freight vehicles are 1.87%.

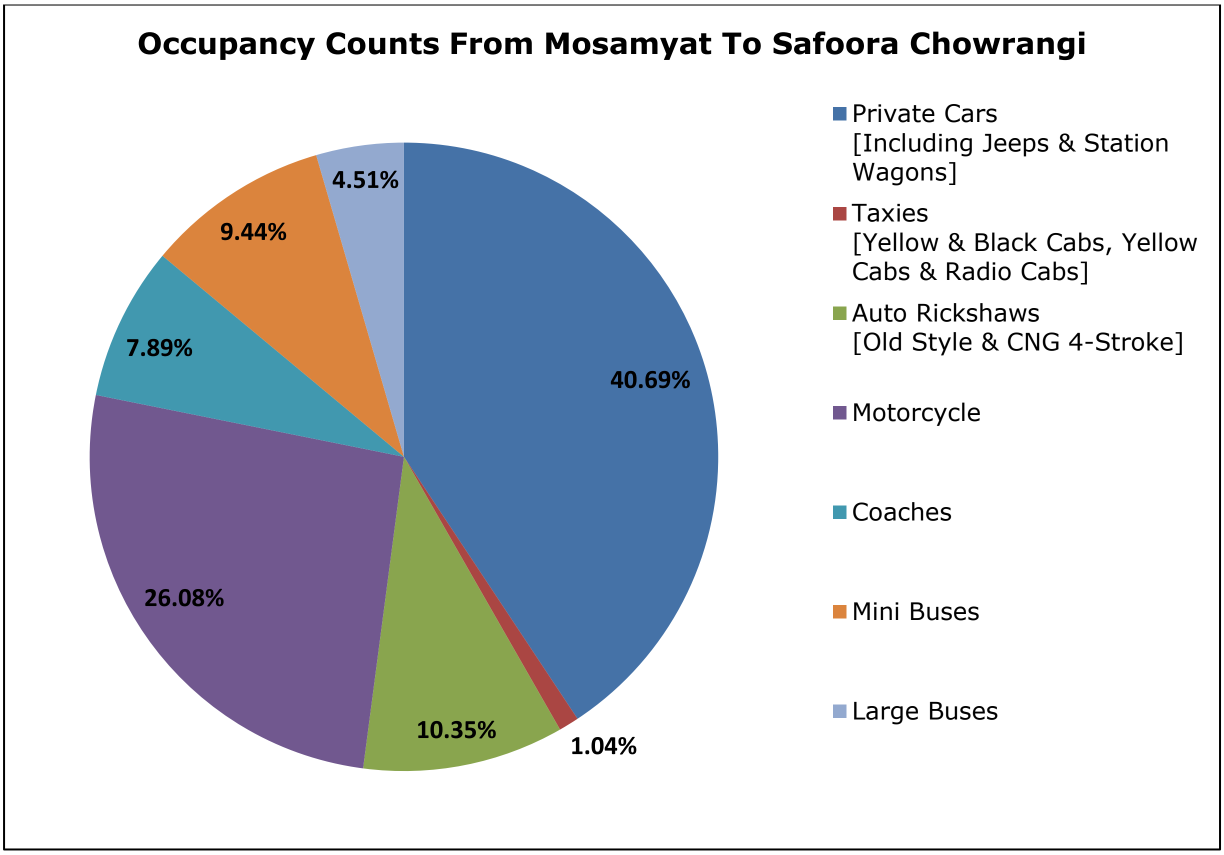


Figure 3.159: Occupancy Counts from Mosamyat to Safoora Chowrangi (OC-38)

In this area occupancy rate for Private cars is very high around 41% passengers counts in single direction from Mosamyat to Safoora Chowrangi. Motorcycles are the second highest which makes around 26%. Public Transport is 21% occupant. ParaTransit makes fewer shares around 11%.

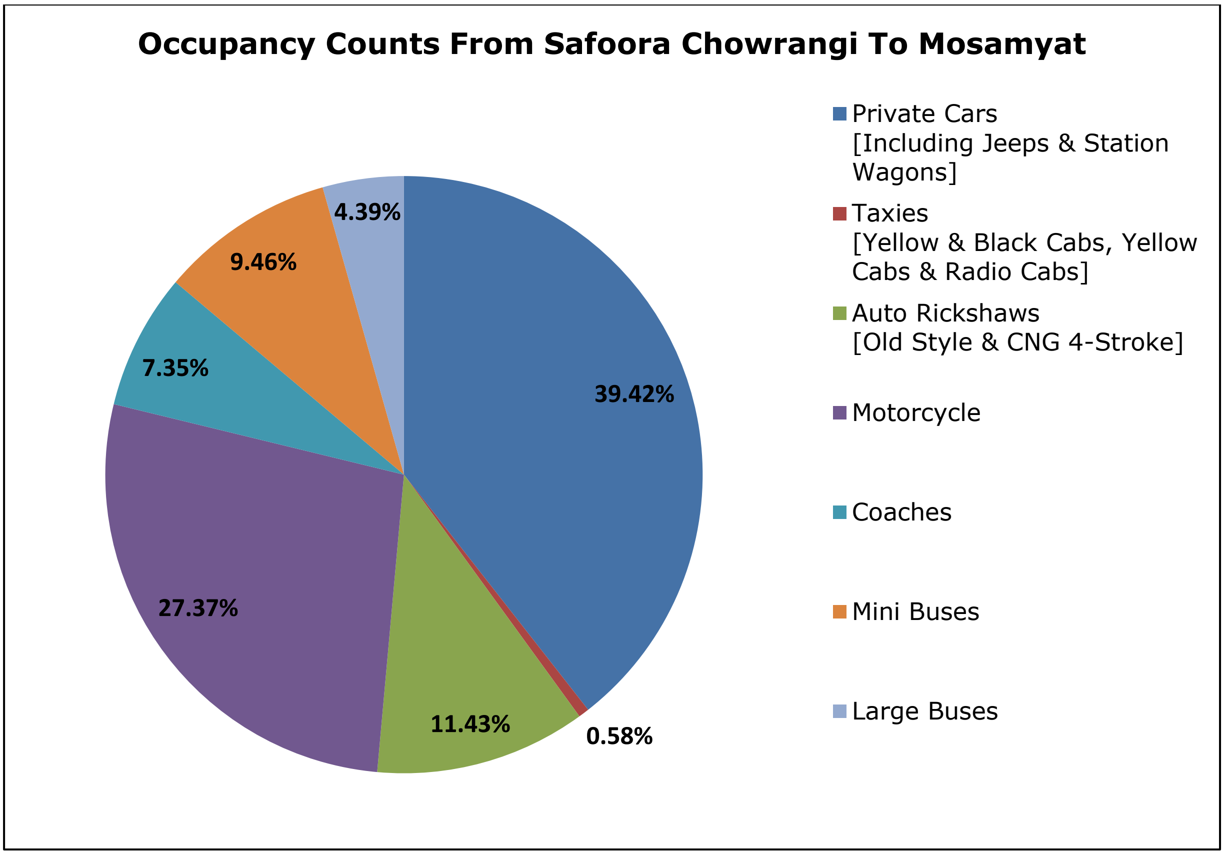


Figure 3.160: Occupancy Counts from Safoora Chowrangi to Mosamyat (OC-38)

In this area occupancy rate for Private cars is very high around 39.42% passengers counts in single direction from Safoora Chowrangi to Mosamyat. Motorcycles are the second highest which makes around 27%. Public Transport is 21% occupant. Para Transit makes fewer shares around 12%.

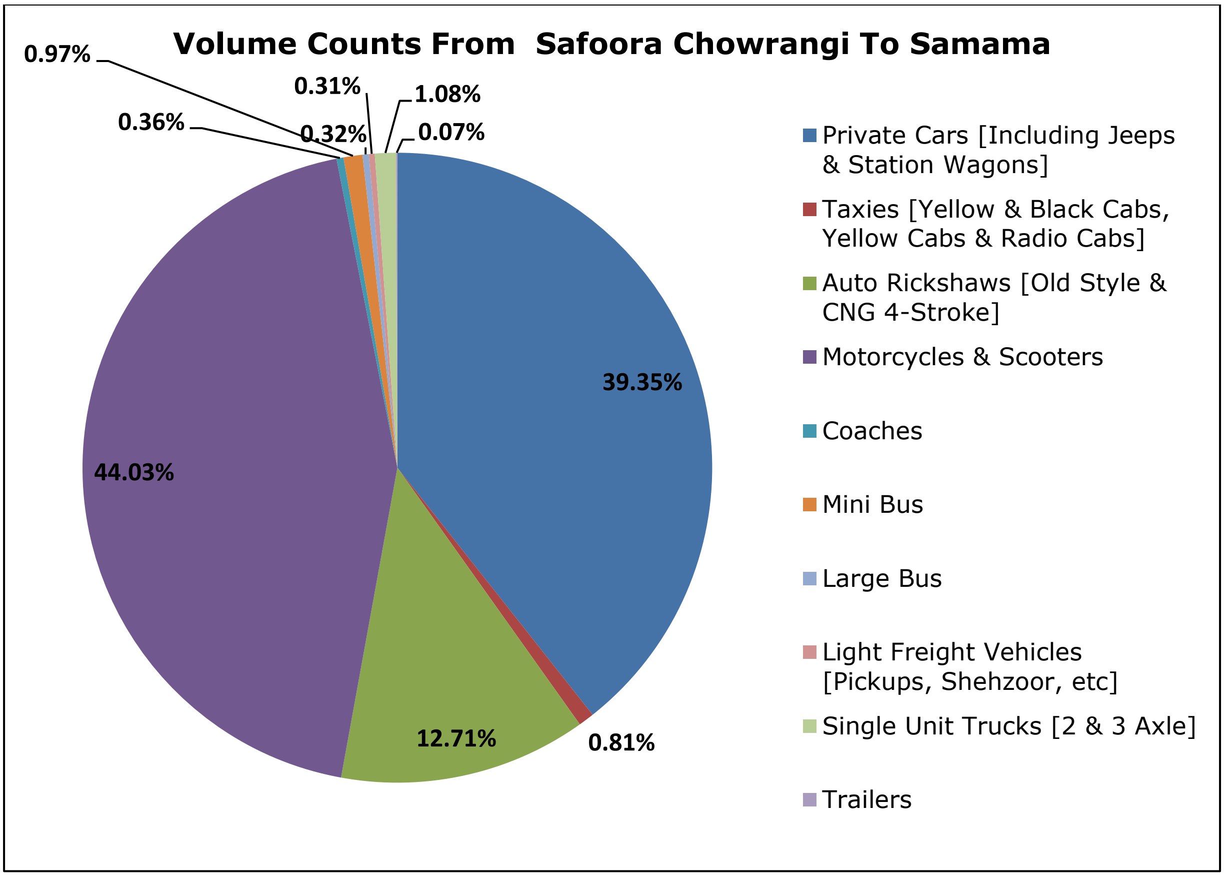


Figure 3.161: Volume Counts from Safoora Chowrangi to Samama (VC-39)

Motorcycle is in high number at this location which constitutes around 44.03% with less number of Public Transport that is 1.62%. Private Cars has 39.35% vehicular traffic share. Out of other modal classifications, Para Transit have 14% share in terms of modal split and Freight vehicles have less value that is 2% modal share.

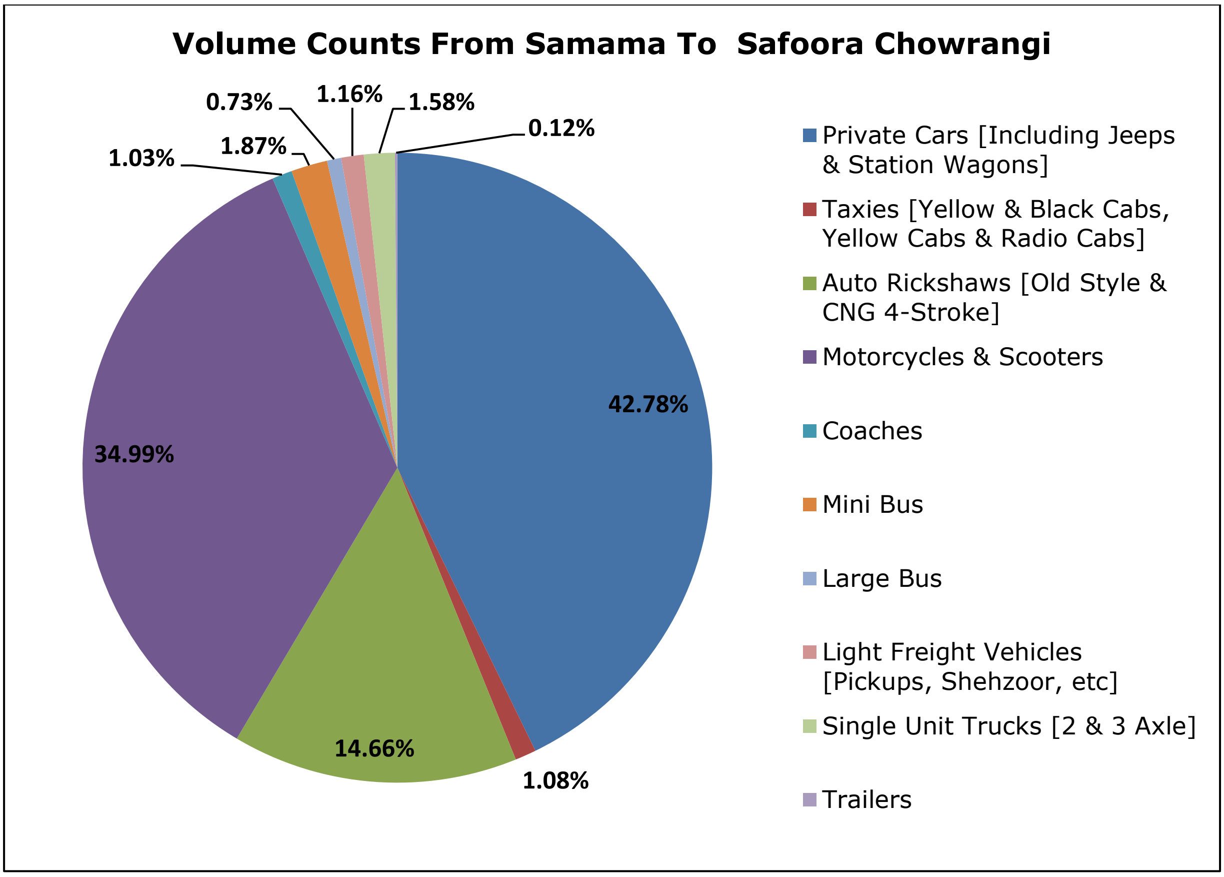


Figure 3.162: Volume Counts from Samama to Safoora Chowrangi (VC-39)

Motorcycle is in high number at this location which constitutes around 42.78% with less number of Public Transport that is 3.6%. Private Cars has 34.99% vehicular traffic share. Out of other modal classifications, Para Transit have 16% share in terms of modal split and Freight vehicles have less value that is 3% modal share.

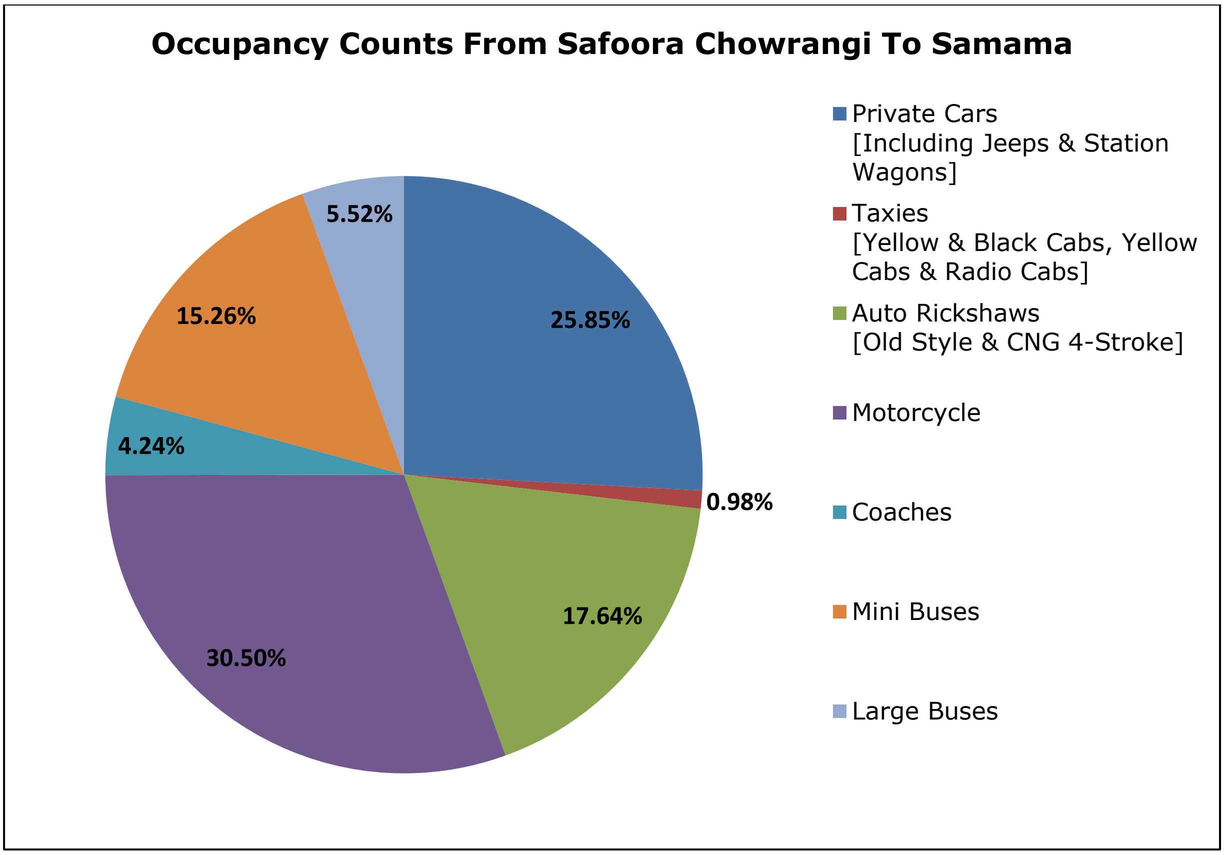


Figure 3.163: Occupancy Counts from Safoora Chowrangi to Samama (OC-39)

In this area occupancy rate for Motorcycles is very high around 30.50% passengers counts in single direction from Safoora Chowrangi to Samama. Private cars are the second highest which makes around 25.85%. Public Transport is 24.96% occupant. Para Transit makes fewer shares around 19%.

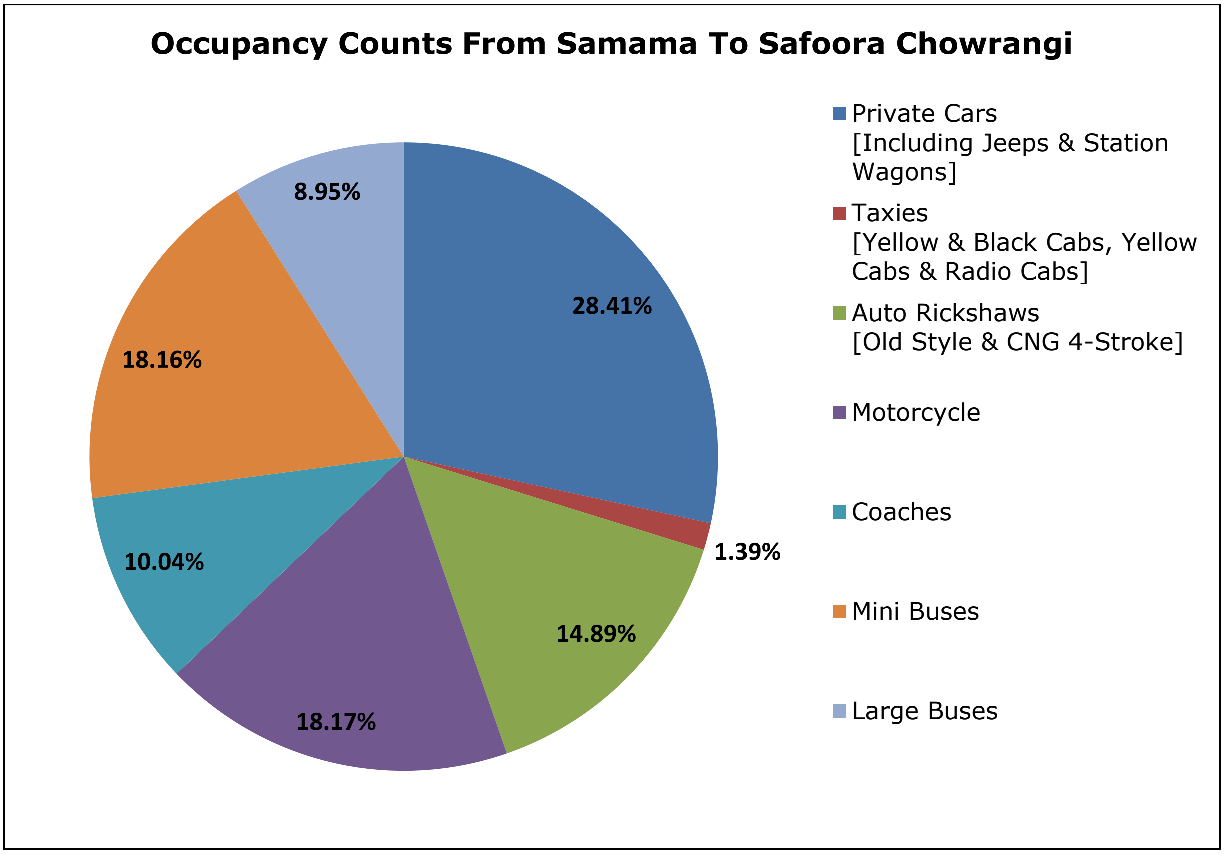


Figure 3.164: Occupancy Counts from Samama to Safoora Chowrangi (OC-39)

In this area occupancy rate for Public Transport is very high around 37% passengers counts in single direction from Samama to Safoora Chowrangi. Private cars are the second highest which makes around 28%. Motorcycles are 28.4% occupant. Para Transit makes fewer shares around 16%.

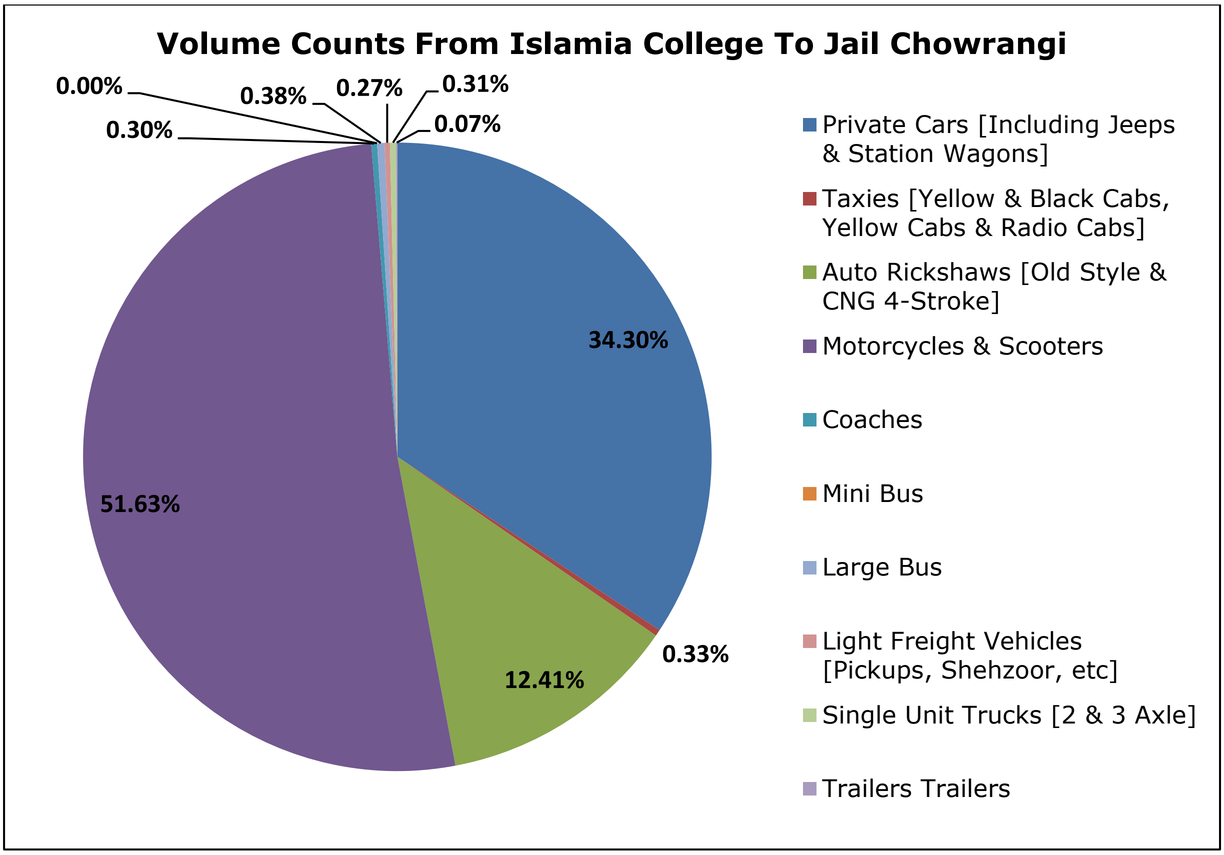


Figure 3.165: Volume Counts from Islamia College to Jail Chowrangi (Weekday) - (VC-40)

On Average Weekday, in this segment of Islamia College to Jail Chowrangi, Private Cars are in high number which constitutes around 34.30% but Motorcycles still leads the modal share with 51.63% of the total. Out of other modal classifications, Paratransit Includes Taxies and Rickshaws have 13% share, Public Transport have 1% share in terms of modal split and Light Freight vehicles are less than 1% modal share.

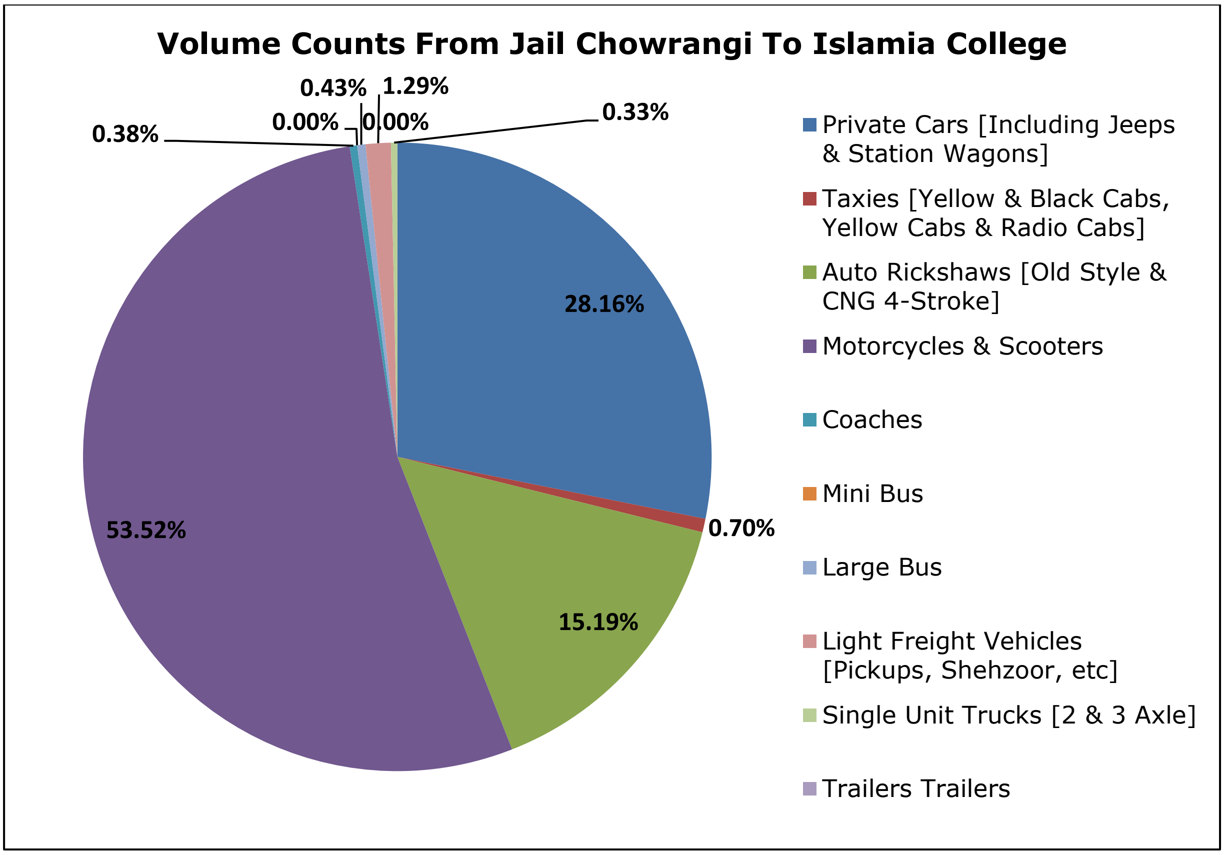


Figure 3.166: Volume Counts from Jail Chowrangi to Islamia College (Weekday) - (VC-40)

On Average Weekday, In this segment of Jail Chowrangi to Islamia College, Private Cars are in high number which constitutes around 28.16% but Motorcycles still leads the modal share with 53.52% of the total. Out of other modal classifications, Para transit Includes Taxies and Rickshaws have 16% share, Public Transport have 1% share in terms of modal split and Light Freight vehicles are less than 1% modal share.

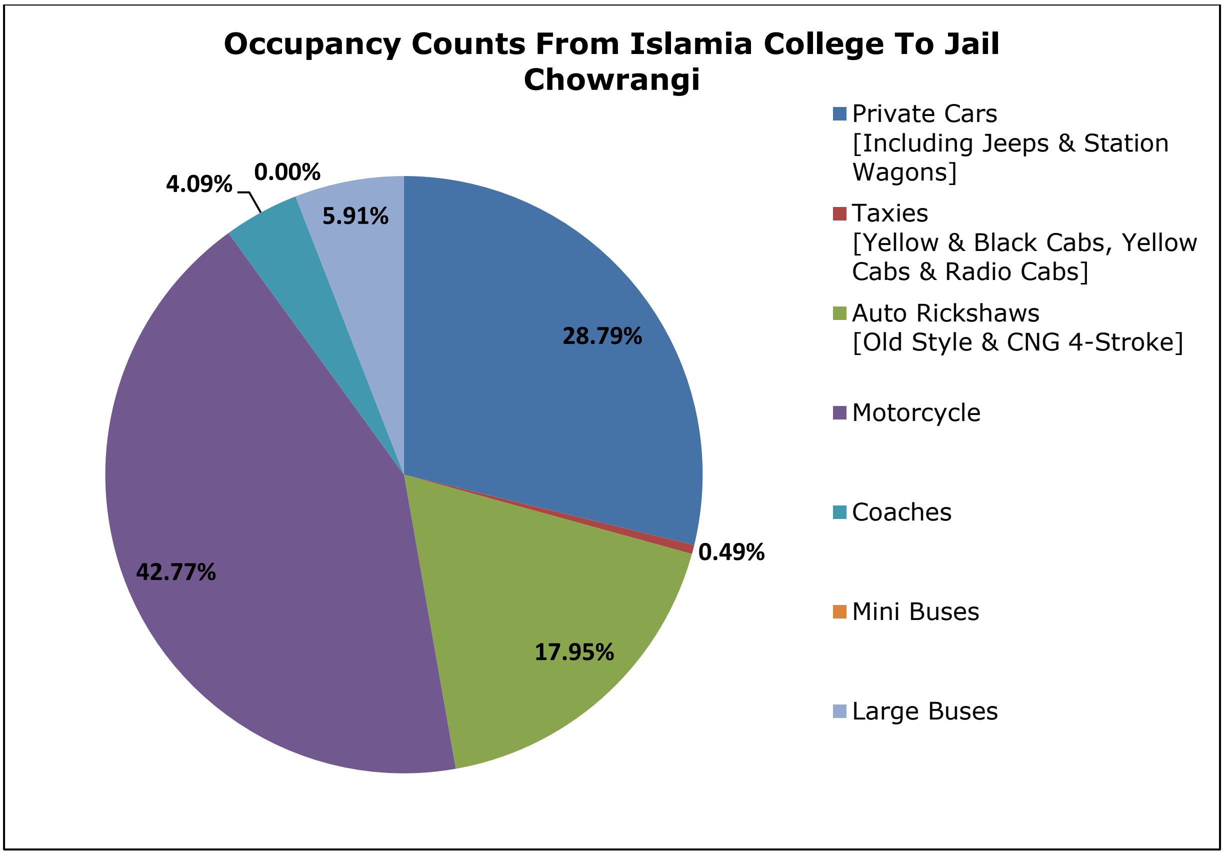


Figure 3.167: Occupancy Counts from Islamia College to Jail Chowrangi (Weekday) - (OC-40)

On Average Weekday, occupancy rate for Motorcycles is very high around 42.77% passengers counts in single direction from Islamia College to Jail Chowrangi. Private cars are the second highest which makes around 28.7%. Para transit is 18% occupant. Public Transport makes fewer shares around 10%.

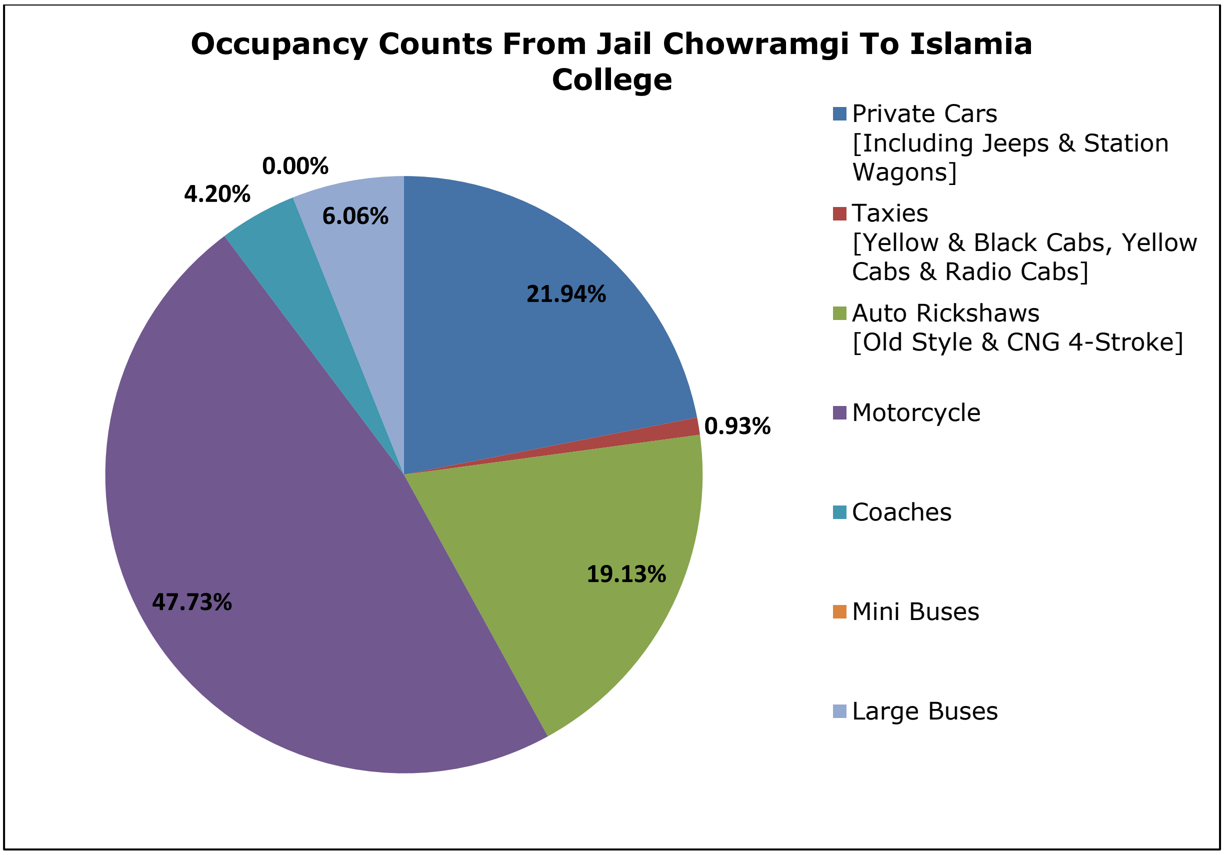


Figure 3.168: Occupancy Counts from Jail Chowrangi to Islamia College (Weekday) - (OC-40)

On Average Weekday, occupancy rate for Motorcycles is very high around 47% passengers counts in single direction from Jail Chowrangi to Islamia College. Private cars are the second highest which makes around 22%. Para transit is 20% occupant. Public Transport makes fewer shares around 10%.

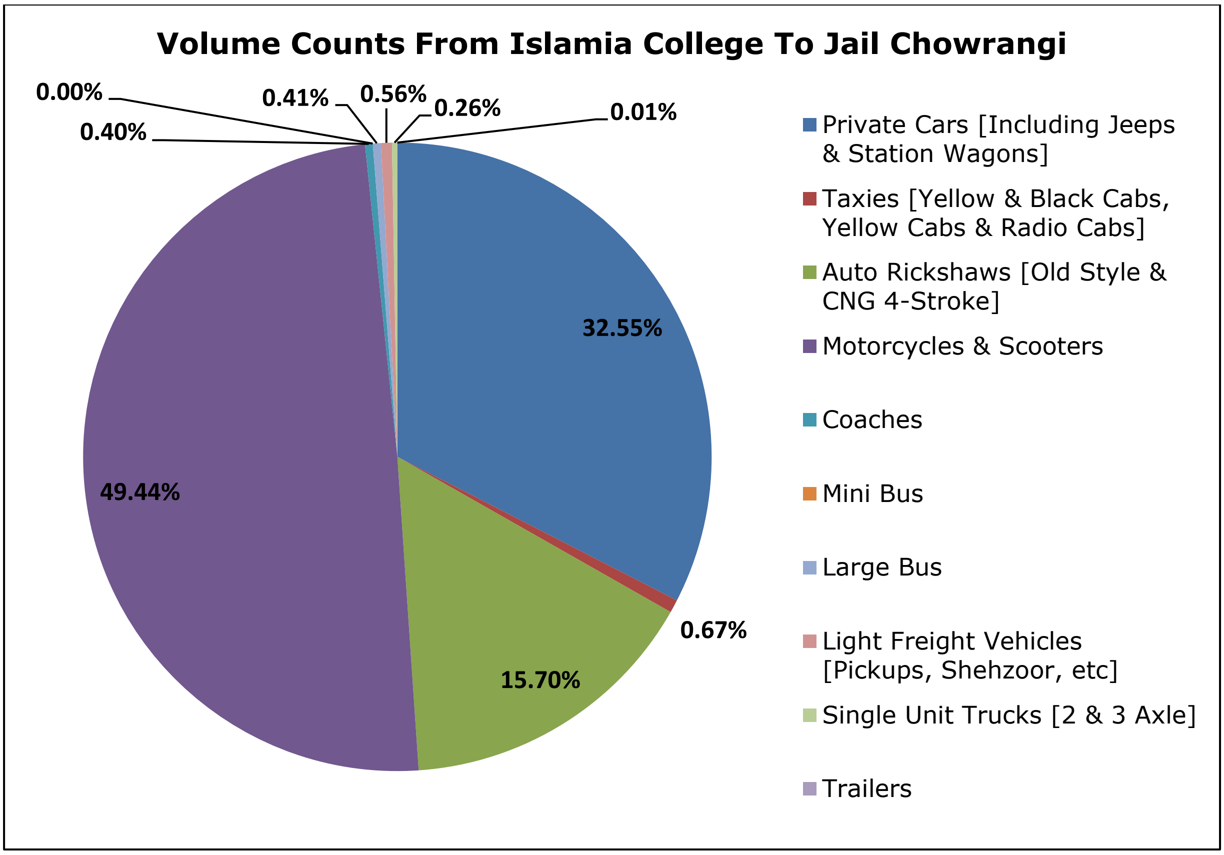


Figure 3.169: Volume Counts from Islamia College to Jail Chowrangi (Weekend) - (VC-40)

On Average Weekdend, in this segment of Islamia College to Jail Chowrangi, Private Cars are in high number which constitutes around 32.55% but Motorcycles still leads the modal share with 49.44% of the total. Out of other modal classifications, Para transit Includes Taxies and Rickshaws have 17% share, Public Transport have 1% share in terms of modal split and Light Freight vehicles are less than 1% modal share.

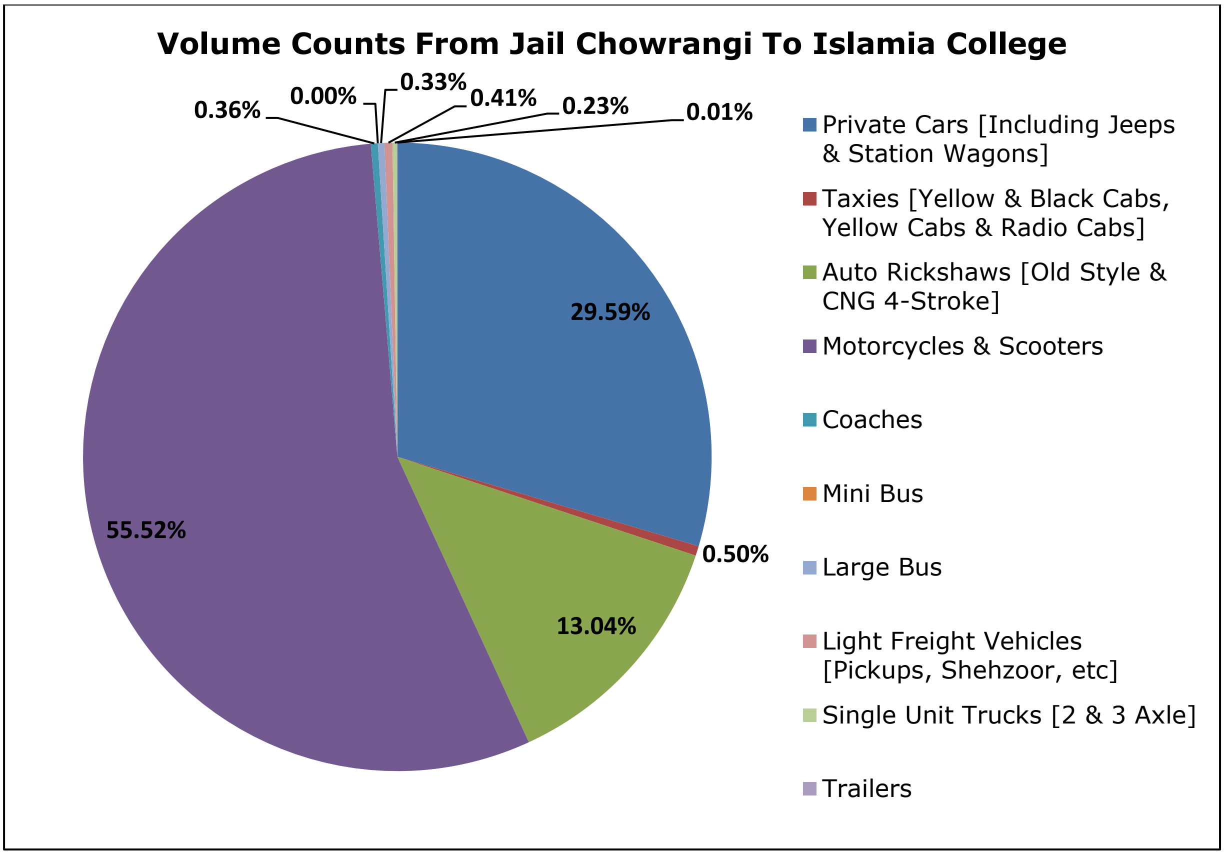


Figure 3.170: Volume Counts from Jail Chowrangi to Islamia College (Weekend) - (VC-40)

On Average Weekend, In this segment of Jail Chowrangi to Islamia College, Private Cars are in high number which constitutes around 29.59% but Motorcycles still leads the modal share with 55.52% of the total. Out of other modal classifications, Para transit Includes Taxies and Rickshaws have 13.54% share, Public Transport have 1% share in terms of modal split and Light Freight vehicles are less than 1% modal share.

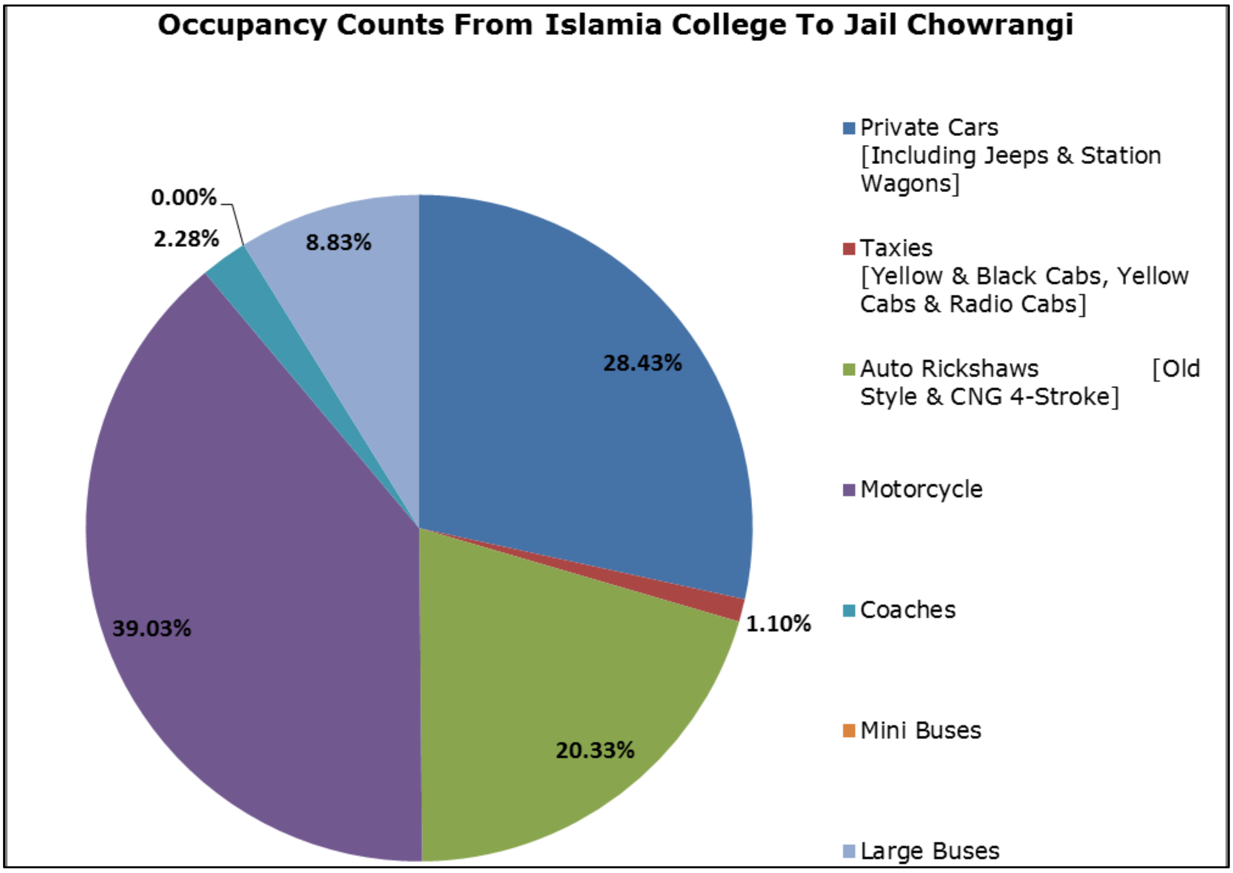


Figure 3.171: Occupancy Counts from Islamia College to Jail Chowrangi (Weekend) - (OC-40)

On Average Weekend, occupancy rate for Motorcycles is very high around 39.03% passengers counts in single direction from Islamia College to Jail Chowrangi. Private cars are the second highest which makes around 28.4%. Para transit is 21% occupant. Public Transport makes fewer shares around 11%.

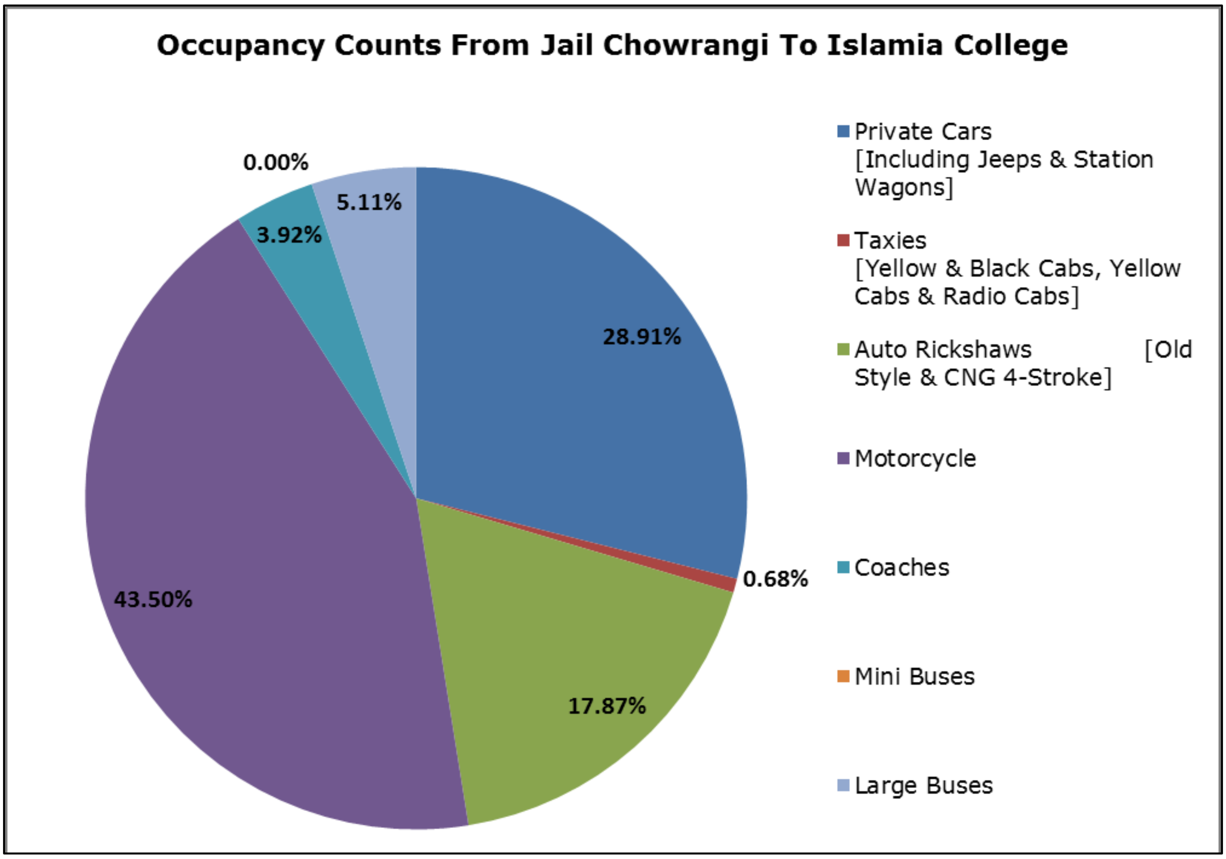


Figure 3.172: Occupancy Counts from Jail Chowrangi to Islamia College (Weekend) - (OC-40)

On Average Weekend, occupancy rate for Motorcycles is very high around 43.5% passengers counts in single direction from Jail Chowrangi to Islamia College. Private cars are the second highest which makes around 28.9%. Para transit is 19% occupant. Public Transport makes fewer shares around 9%.

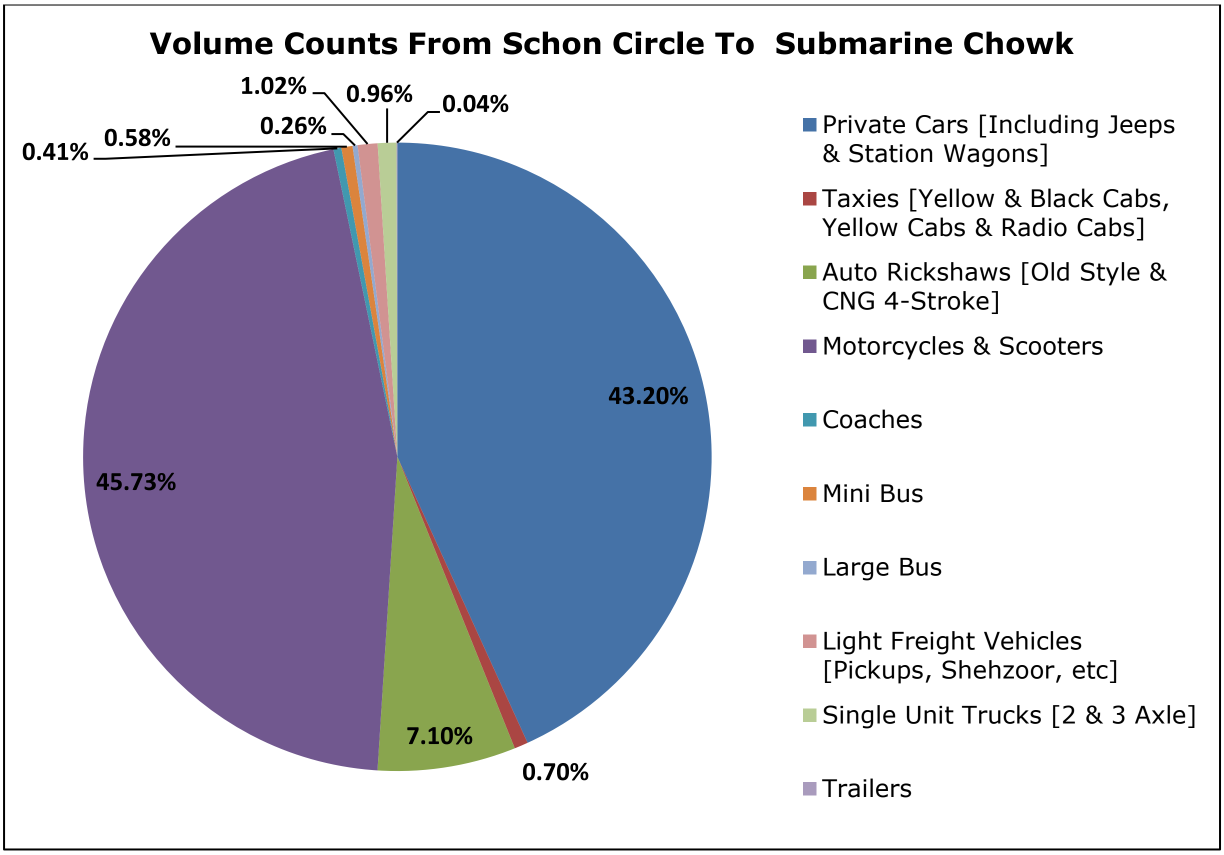


Figure 3.173: Volume Counts from Schon Circle to Submarine Chowk (VC-41)

Private Cars and Motor Cycles are predominant mode of transport even in this segment as they sum up to around 88.9% of the total modal split with 43.20% and 45.73% share respectively. Other major modes in this area are Para transit which constitutes around 8% also Public Transport Consists 1.25% vehicular traffic share and Freight Vehicles are 2% of the total modal share.

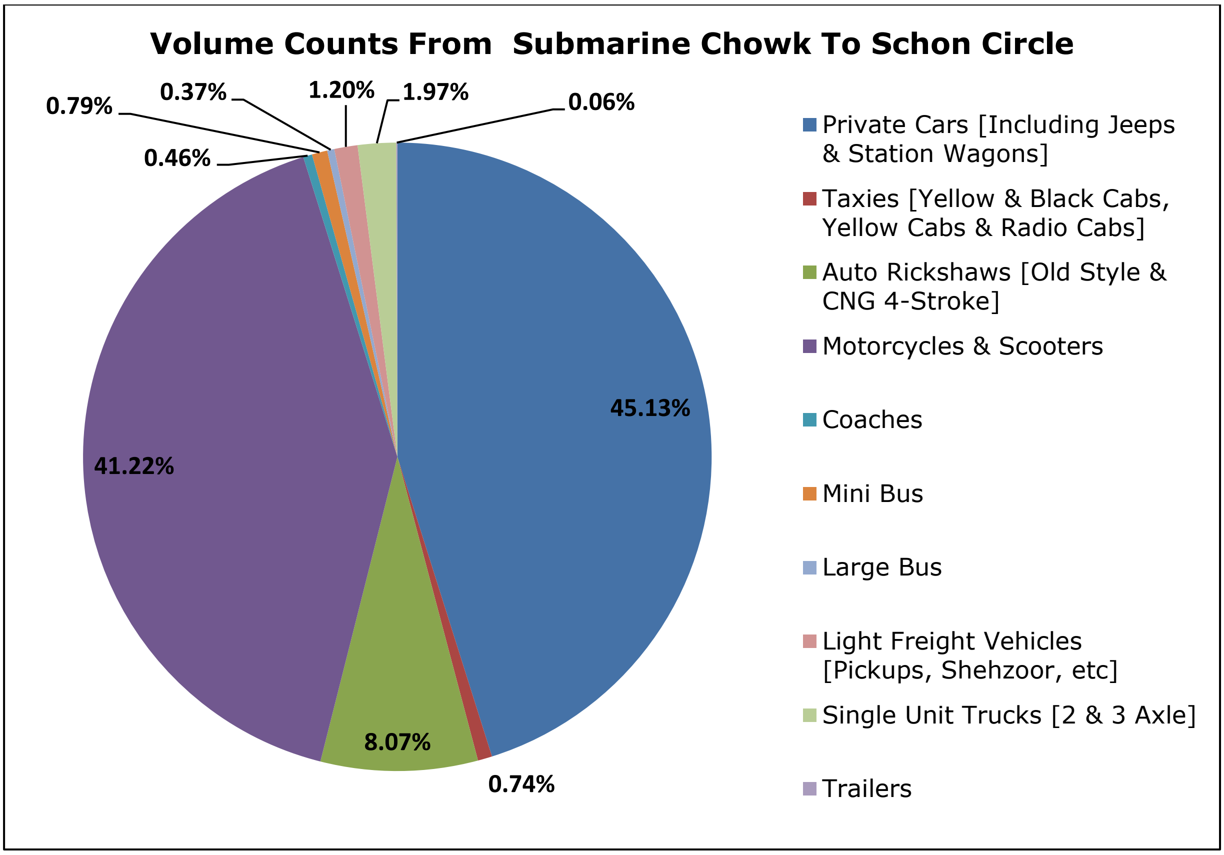


Figure 3.174: Volume Counts from Submarine Chowk to Schon Circle (VC-41)

Private Cars and Motor Cycles are predominant mode of transport even in this segment as they sum up to around 86% of the total modal split with 41% and 45% share respectively. Other major modes in this area are Para transit which constitutes around 9% also Public Transport Consists 1.62% vehicular traffic share and Freight Vehicles are 3% of the total modal share.

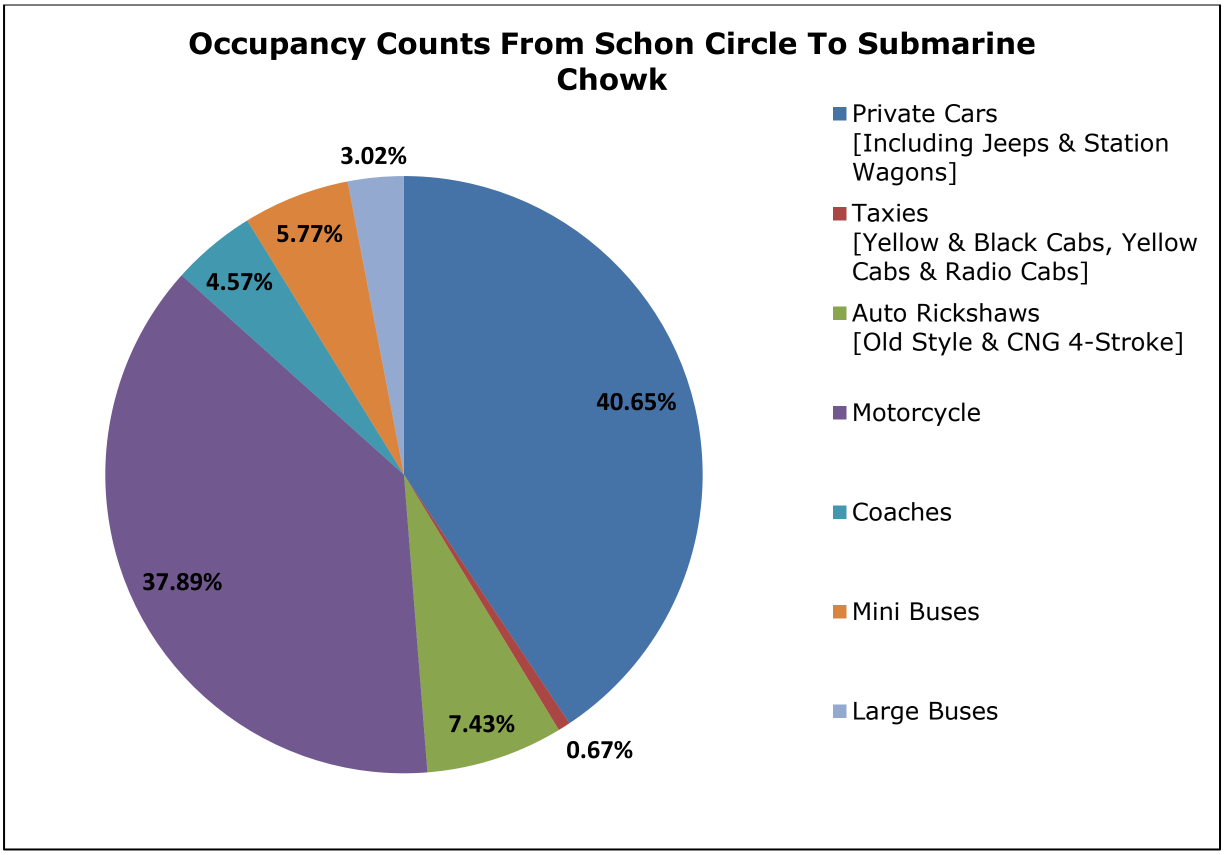


Figure 3.175: **Occupancy Counts from Schon Circle to Submarine Chowk (OC-41)**

In this area occupancy rate for Private cars is very high around 40.65% passengers counts in single direction from Schon Circle to Submarine Chowk. Motorcycles are the second highest which makes around 37.89%. Public Transport is 13.5% occupant. Para Transit makes fewer shares around 8%.

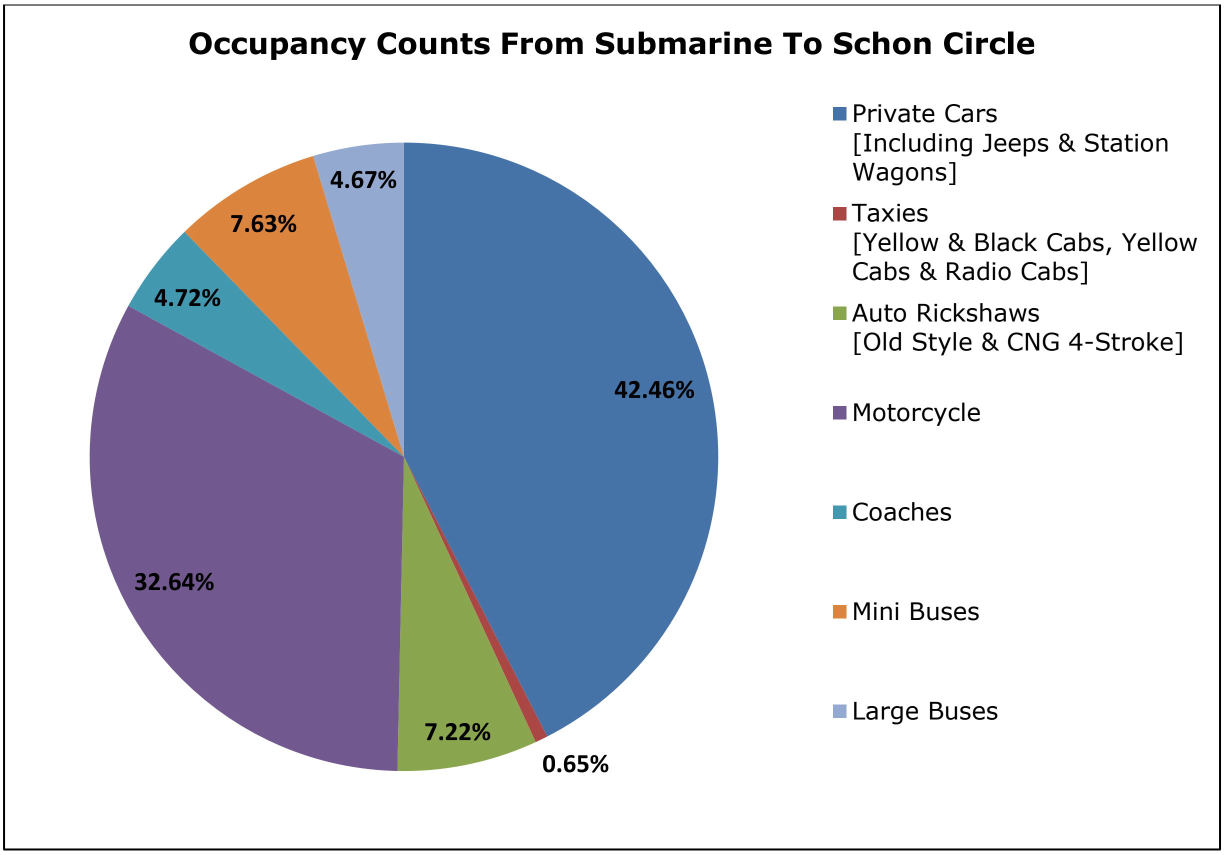


Figure 3.176: **Occupancy Counts from Submarine Chowk to Schon Circle (OC-41)**

In this area occupancy rate for Private cars is very high around 42.46% passengers counts in single direction from Submarine Chowk to Schon Circle. Motorcycles are the second highest which makes around 32.64%. Public Transport is 17% occupant. Para Transit makes fewer shares around 8%.

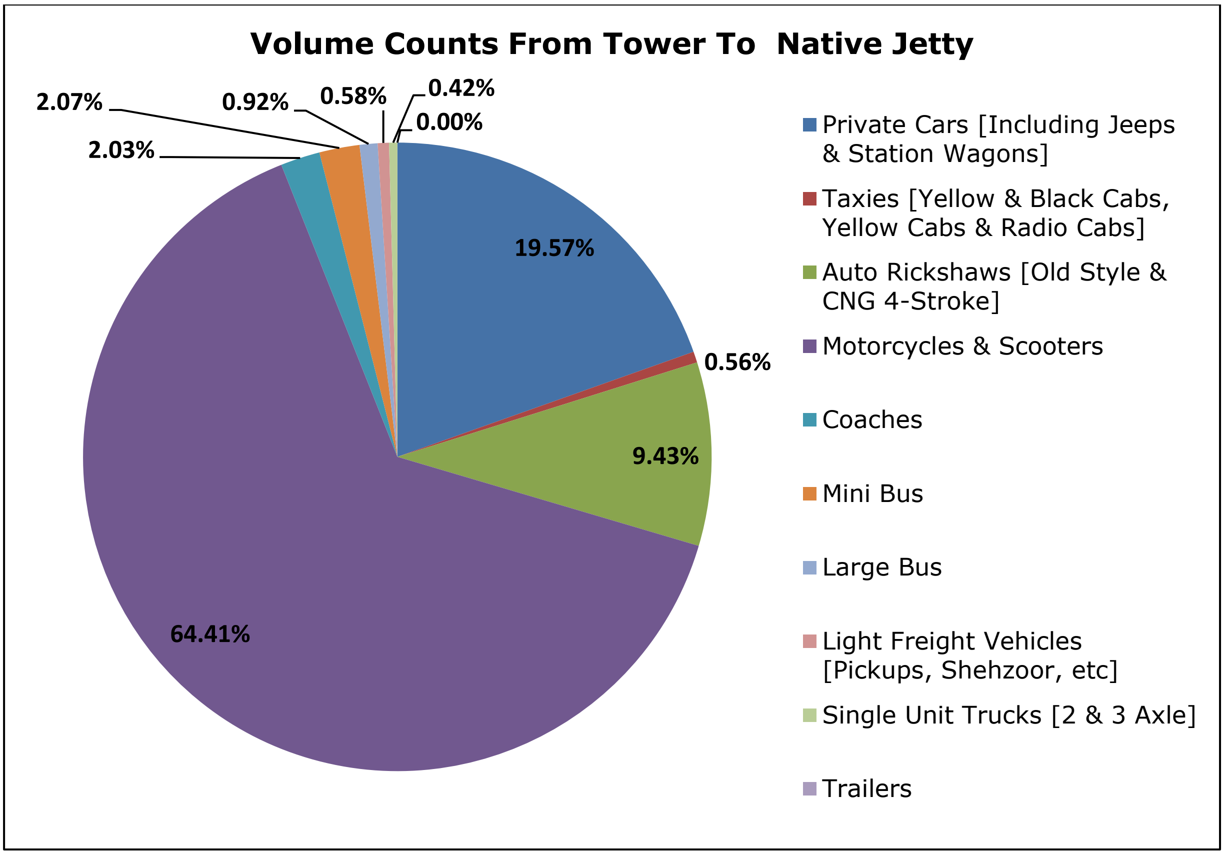


Figure 3.177**: Volume Counts from Tower to Native Jetty (VC-42)**

Private Cars and Motor Cycles are predominant mode of transport even in this segment as they sum up to around 83.98% of the total modal split with 64.41% and 19.57% share respectively. Other major modes in this area are Para transit which constitutes around 10% also Public Transport Consists 4.92% vehicular traffic share and Freight Vehicles are 1% of the total modal share.

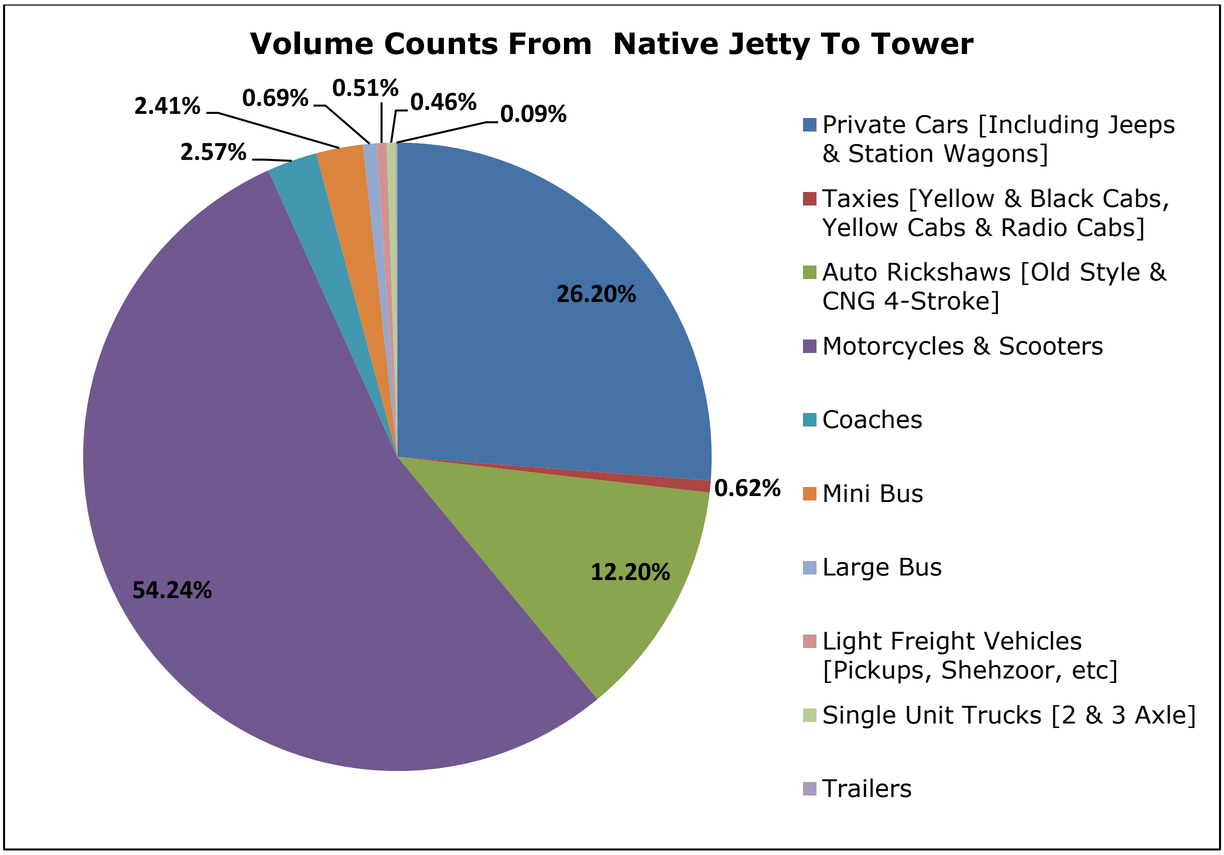


Figure 3.178: **Volume Counts from Native Jetty to Tower (VC-42)**

Private Cars and Motor Cycles are predominant mode of transport even in this segment as they sum up to around 80.44% of the total modal split with 54.24% and 26.20% share respectively. Other major modes in this area are Para transit which constitutes around 13% also Public Transport Consists 5.69% vehicular traffic share and Freight Vehicles are 1% of the total modal share.

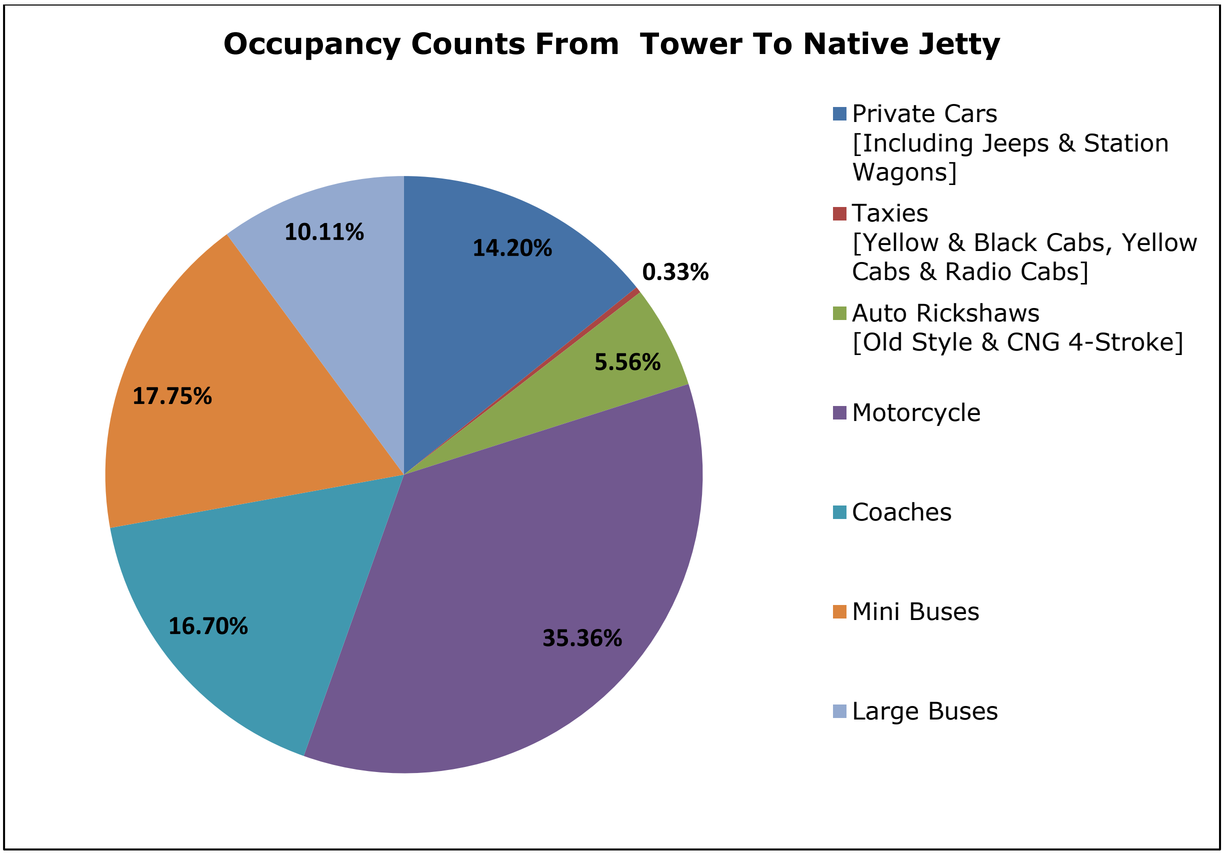


Figure 3.179**: Occupancy Counts from Tower to Native Jetty (OC-42)**

In this area occupancy rate for Public Transport is very high around 44% passengers counts in single direction from Tower to Native Jetty. Motorcycles are the second highest which makes around 35%. Private cars are 14% occupant. Para Transit makes fewer shares around 6%.

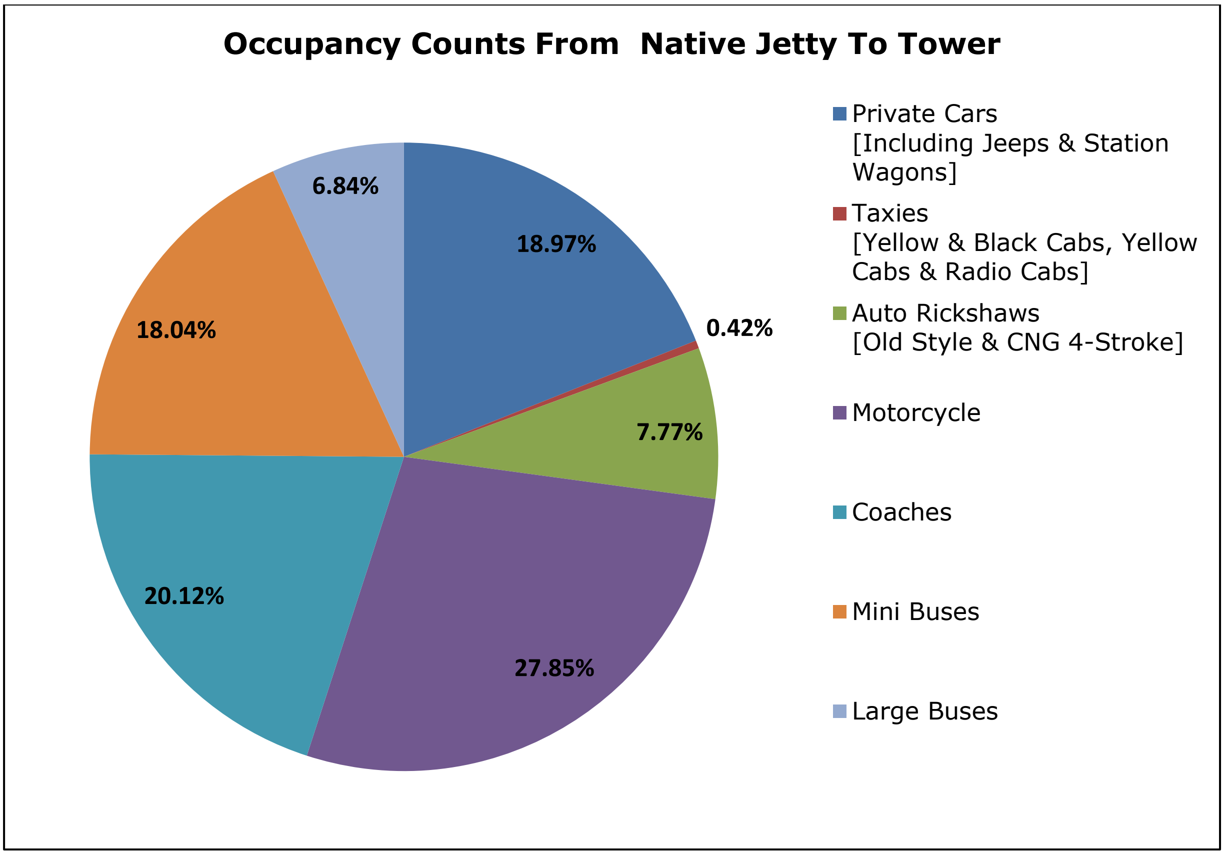


Figure 3.180**: Occupancy Counts from Native Jetty to Tower (OC-42)**

In this area occupancy rate for Public Transport is very high around 44% passengers counts in single direction from Native Jetty to Tower. Motorcycles are the second highest which makes around 27.85%. Private cars are 18.97% occupant. Para Transit makes fewer shares around 8%.

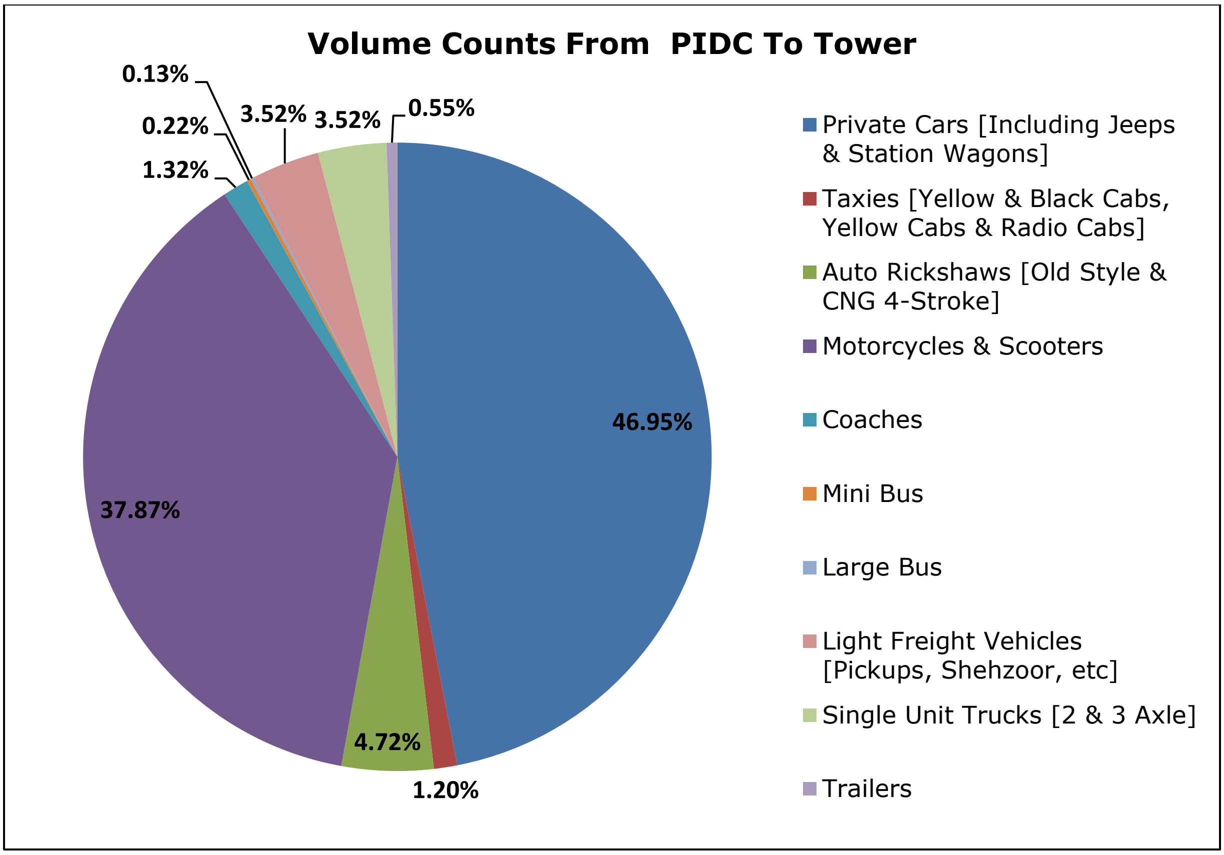


Figure 3.181: **Volume Counts from PDIC to Tower (VC-43)**

Private cars constitute the highest percentage of modal share which is 46.95% of the total and if Motorcycle be included which is 37.87% it makes more than three quarter of the total modal split which clearly suggests that the private vehicle dependency is very high. Para Transit constitutes around 6% of the vehicular mix. Public and freight Transport collectively form 9.26% of vehicular traffic which is on a very lower side.

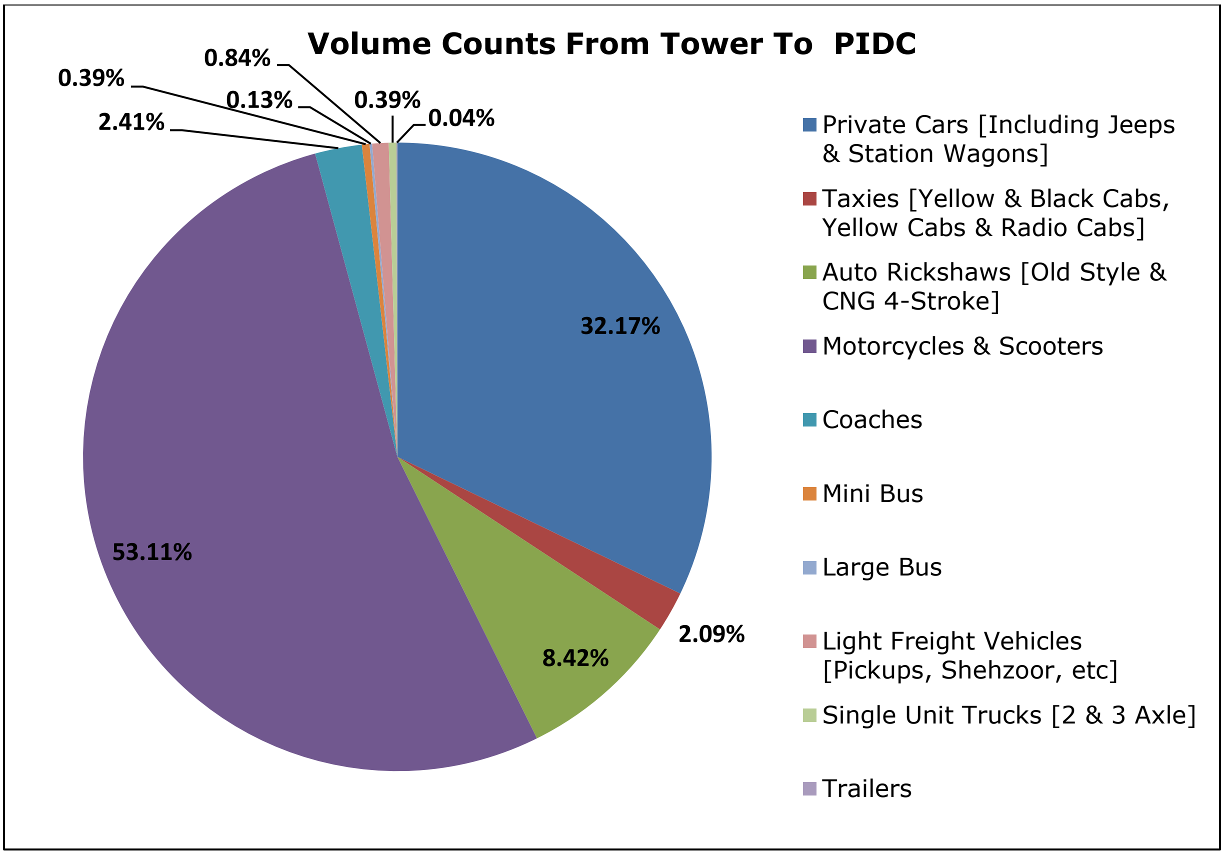


Figure 3.182: **Volume Counts from Tower to PDIC (VC-43)**

Motorcycle constitute the highest percentage of modal share which is 53.11% of the total and if Private cars be included which is 32.17% it makes more than three quarter of the total modal split which clearly suggests that the private vehicle dependency is very high. Para Transit constitutes around 10% of the vehicular mix. Public and freight Transport collectively form 4% of vehicular traffic which is on a very lower side.

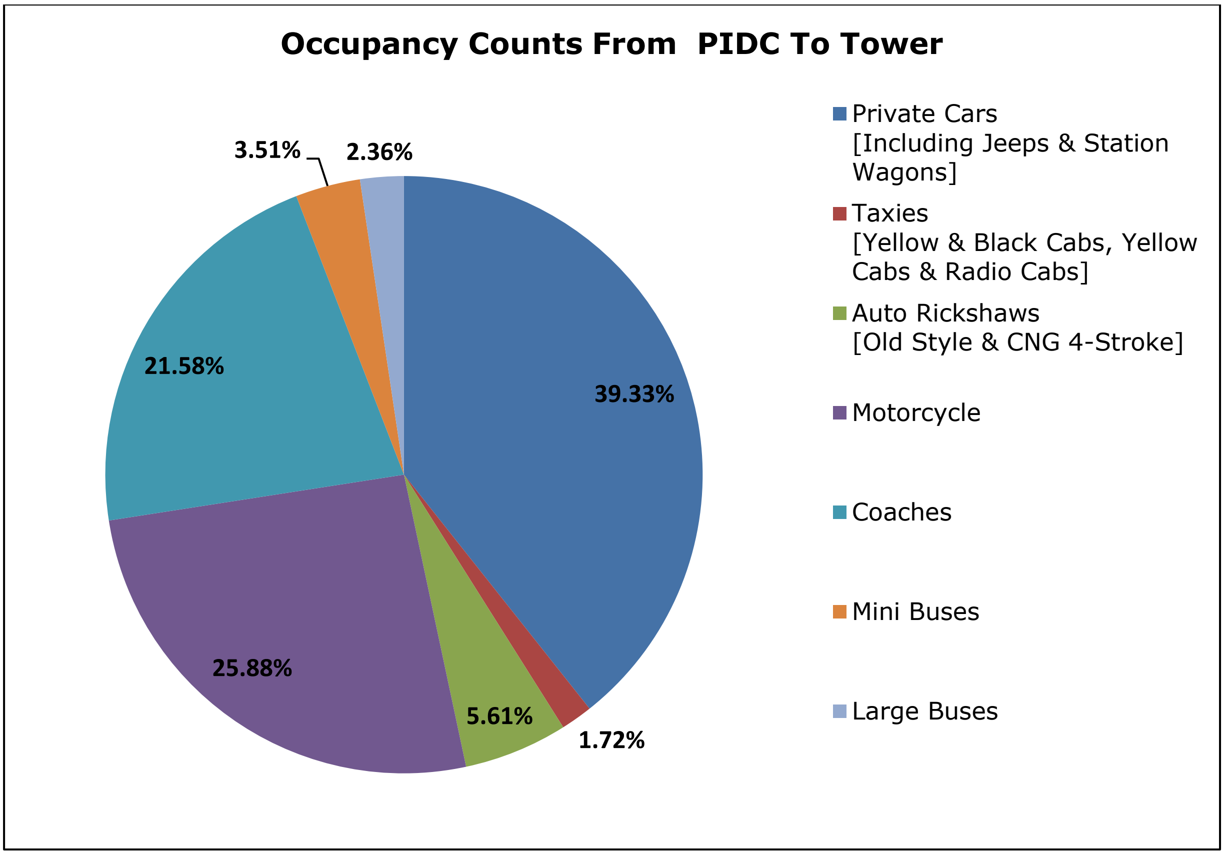


Figure 3.183**: Occupancy Counts from PDIC to Tower (OC-43)**

In this area occupancy rate for Private cars is very high around 39% passengers counts in single direction from from PDIC to Tower. Public Transport is the second highest which makes around 27%. Motorcycles are 25.8% occupant. Para Transit makes fewer shares around 7.73%.

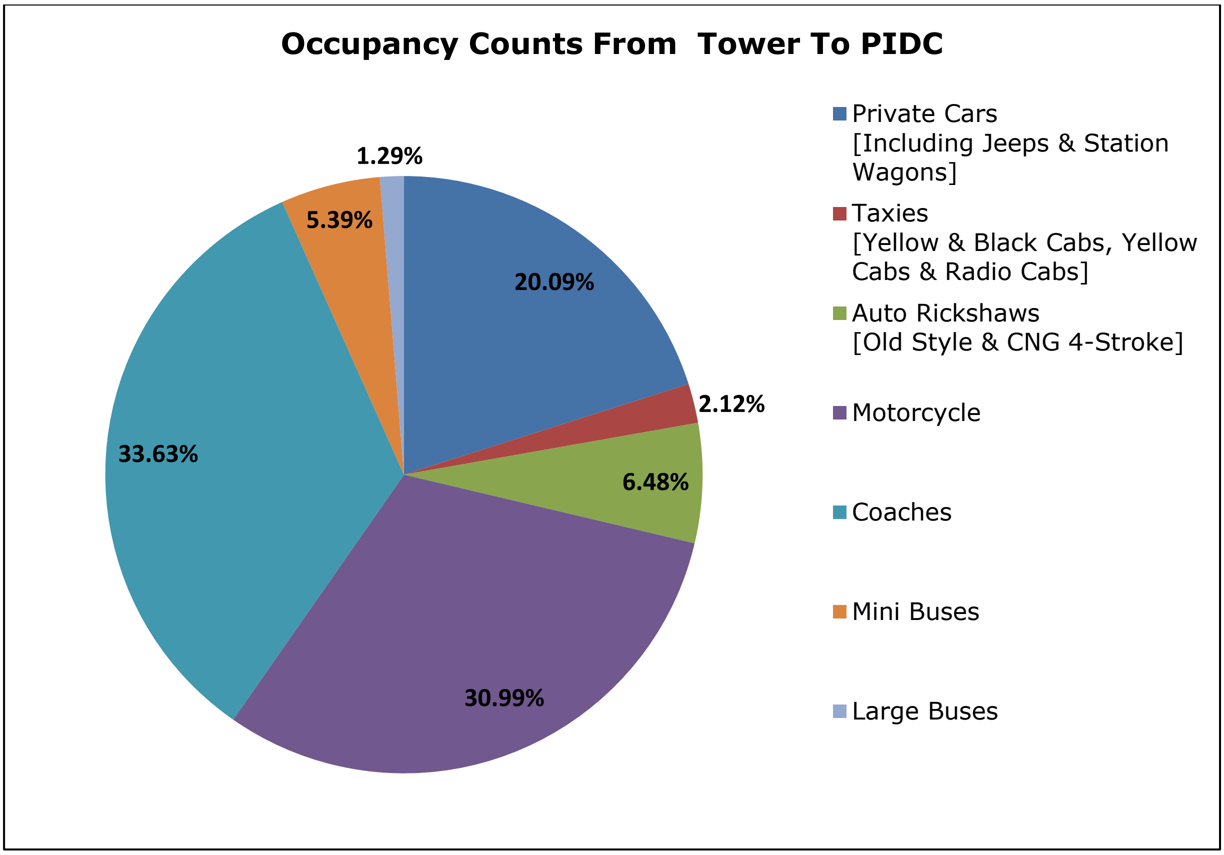


Figure 3.184**: Occupancy Counts from Tower to PDIC (OC-43)**

In this area occupancy rate for Public Transport is very high around 40% passengers counts in single direction from Tower to PDIC. Motorcycles are the second highest which makes around 30.9%. Private cars are 21% occupant. Para Transit makes fewer shares around 9%.

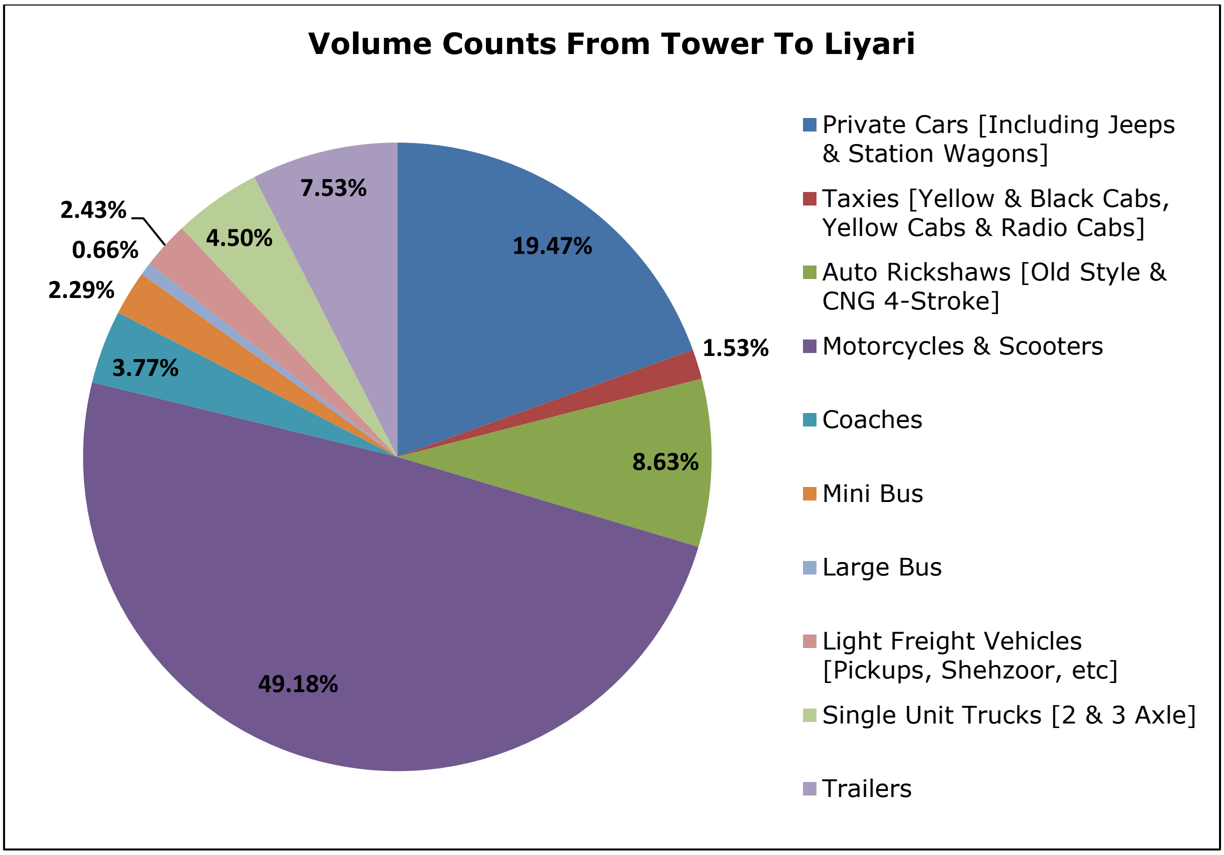


Figure 3.185: Volume Counts from Tower to Liyari (VC-44)

Private Cars and Motor Cycles are predominant mode of transport even in this segment as they sum up to around 68.65% of the total modal split with 19.47% and 49.18% share respectively. Other major modes in this area are Freight Vehicles Consists 14.46% vehicular traffic share also Para transit which constitutes around 10% and Public Transport are 6.7% of the total modal share.

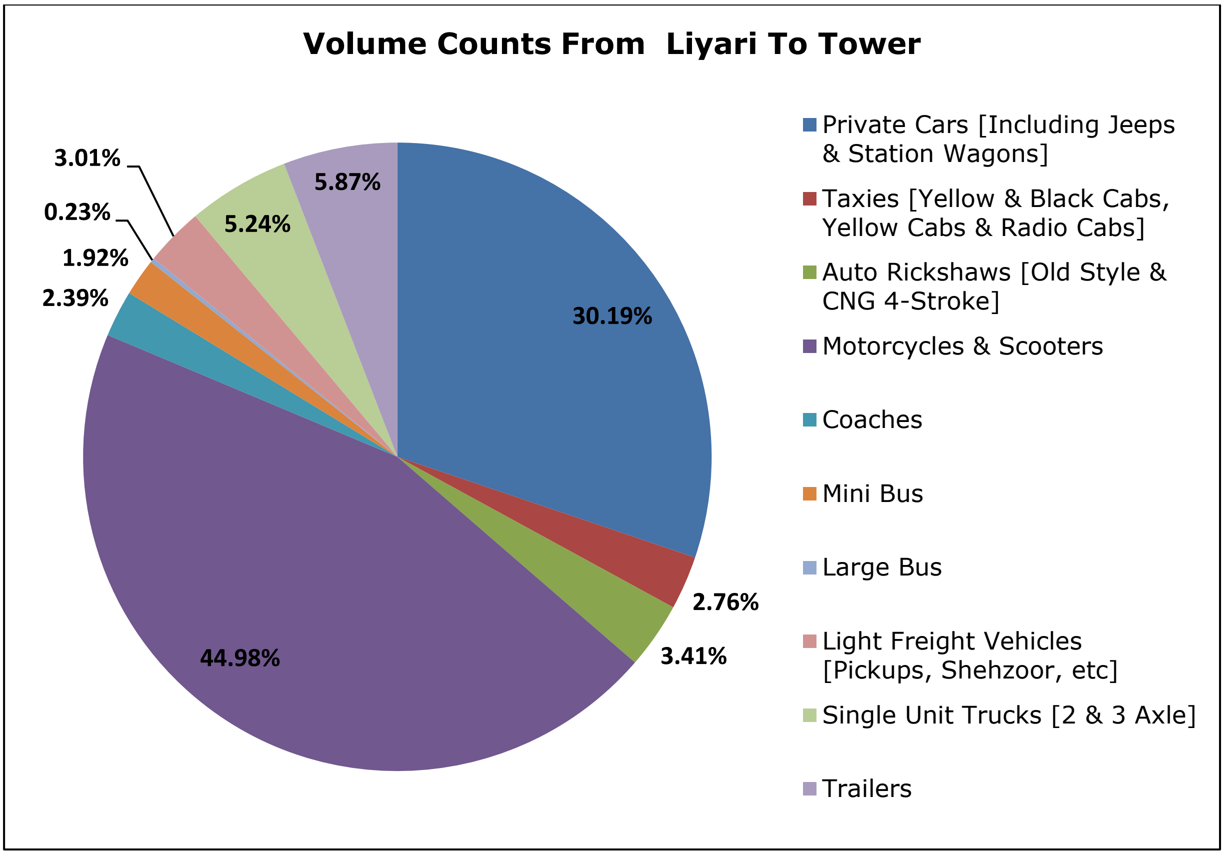


Figure 3.186: Volume Counts from Liyari to Tower (VC-44)

Private Cars and Motor Cycles are predominant mode of transport even in this segment as they sum up to around 75.17% of the total modal split with 30.19% and 44.98% share respectively. Other major modes in this area are Freight Vehicles which constitutes around 14% of the total modal share also Para transit is 6% and Public Transport Consists 4.54% vehicular traffic share.

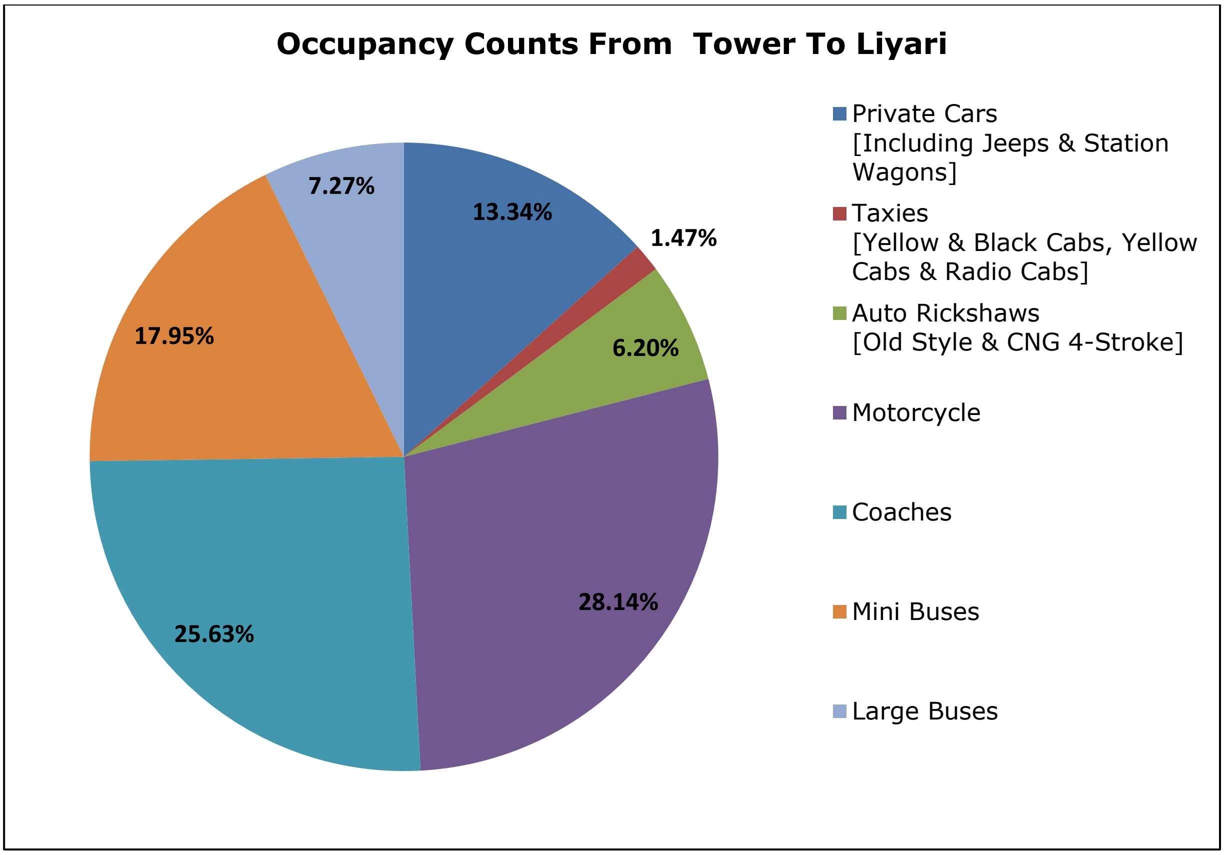


Figure 3.186: **Occupancy Counts from Tower to Liyari (OC-44)**

In this area occupancy rate for Public Transport is very high around 50.77% passengers counts in single direction from Tower to Liyari. Motorcycles are the second highest which makes around 28%. Private cars are 13.34% occupant. Para Transit makes less share around 7%.

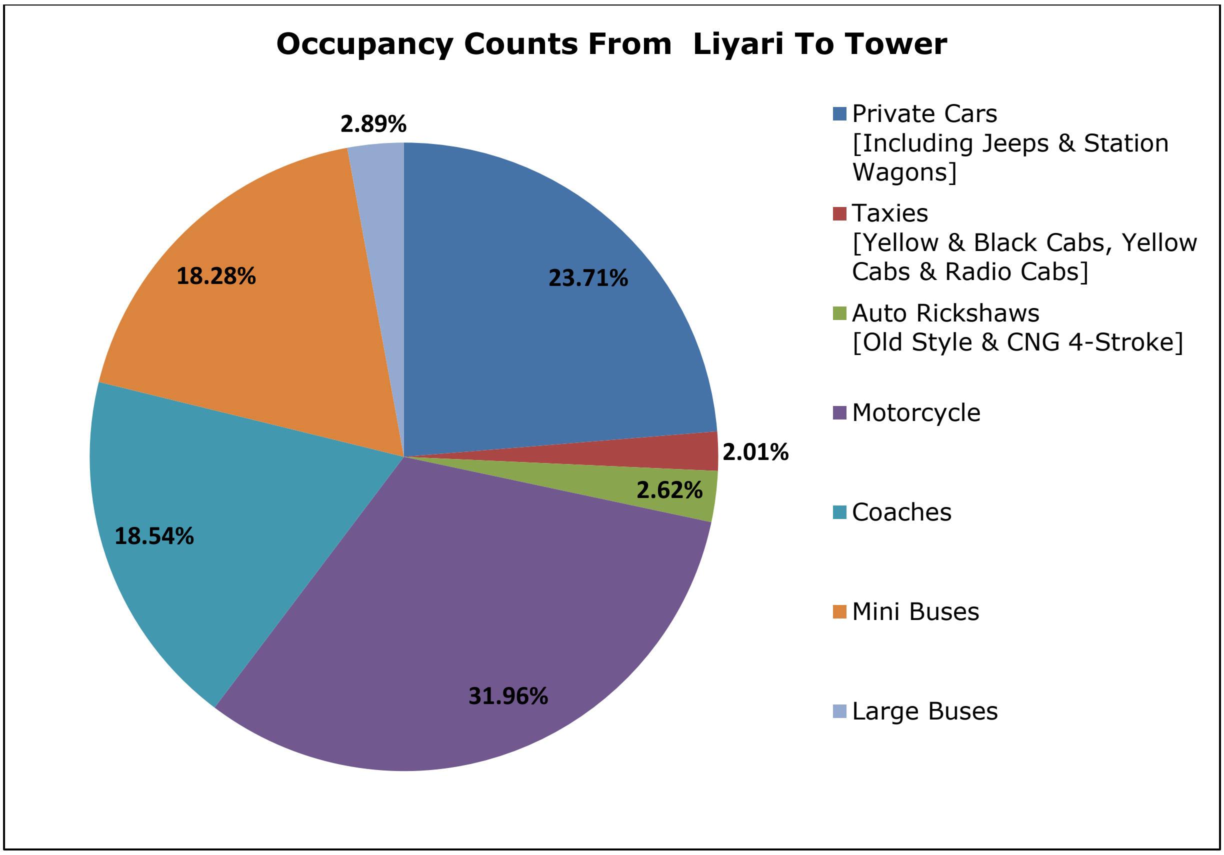


Figure 3.187: **Occupancy Counts from Liyari to Tower (OC-44)**

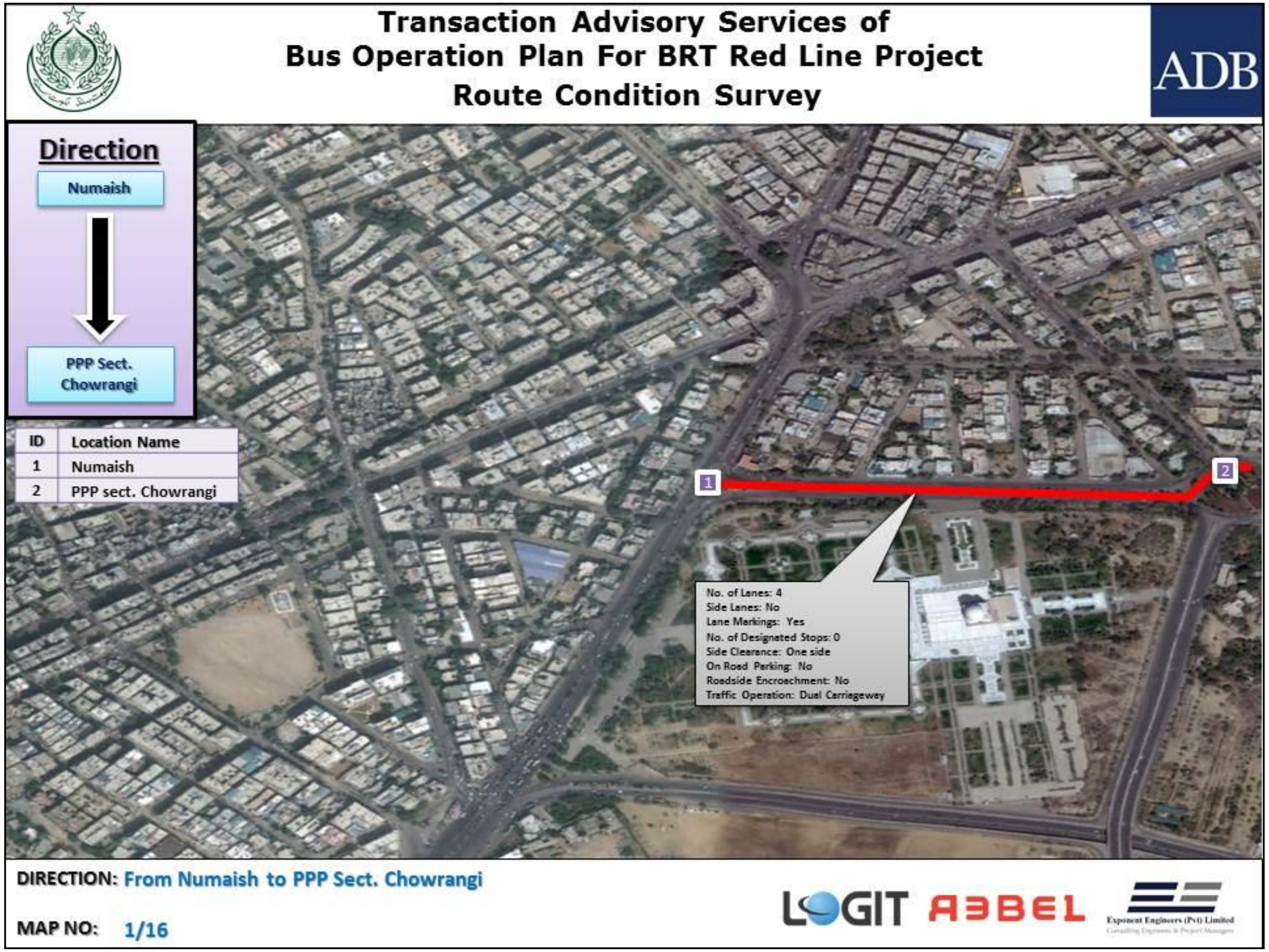
In this area occupancy rate for Public Transport is very high around 38.8% passengers counts in single direction from Liyari to Tower. Motorcycles are the second highest which makes around 32%. Private cars are 23.71% occupant. Para Transit makes fewer shares around 5%.

3.2. Route Condition Survey:

Route Condition Survey was conducted to collect the existing Right of Way (ROW) of all the On-Corridor and Off-Corridor BRTS Network. Following is the list of information collected in this survey:

- ✓ Route Segment Travelled
- ✓ Segment Length
- ✓ No of Lanes
- ✓ Side Lanes
- ✓ Lane Markings
- ✓ No. of Designated Stops
- ✓ Side Clearance
- ✓ On Road Parking
- ✓ Road side Encroachments
- ✓ Traffic Operations (One Way / Two Way)
- ✓ Median Available (In case of Two Way Operations)

All the above information has been used in proposing operational plan for the BRTS corridors especially in the area where topographical features and ROW was a serious concern. Figures below shows the pictorial representation of the data set collected for this survey for BRTS Corridors on Red and Yellow Line.



Transaction Advisory Services of
Bus Operation Plan For BRT Red Line Project
Route Condition Survey

Direction

Numaish

PPP Sect. Chowrangi

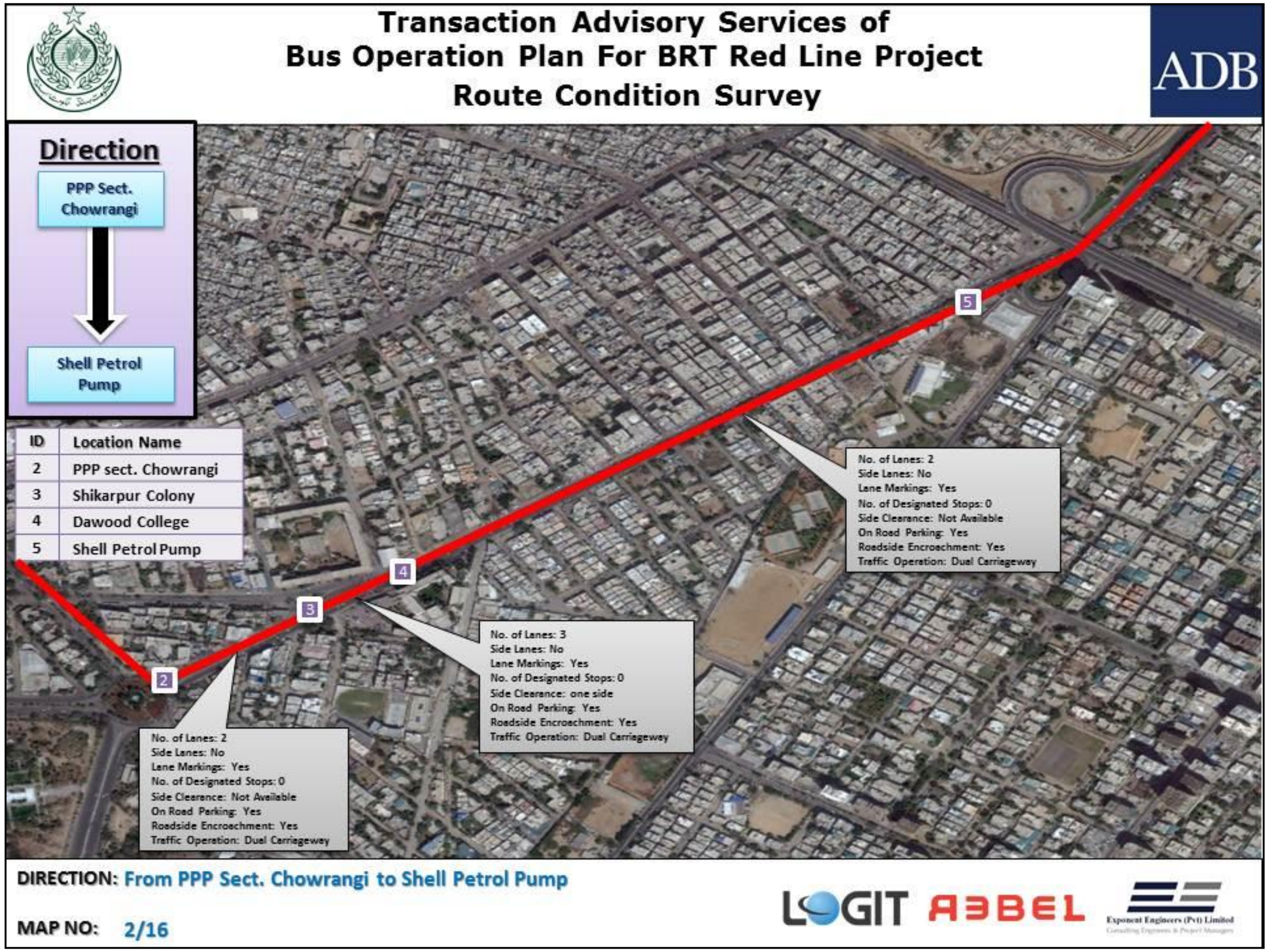
ID	Location Name
1	Numaish
2	PPP sect. Chowrangi

No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

DIRECTION: From Numaish to PPP Sect. Chowrangi

MAP NO: 1/16

Figure 3.188: Route Condition Survey Route 1-A (i)



Transaction Advisory Services of
Bus Operation Plan For BRT Red Line Project
Route Condition Survey

ID	Location Name
2	PPP sect. Chowrangi
3	Shikarpur Colony
4	Dawood College
5	Shell Petrol Pump

No. of Lanes: 2
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

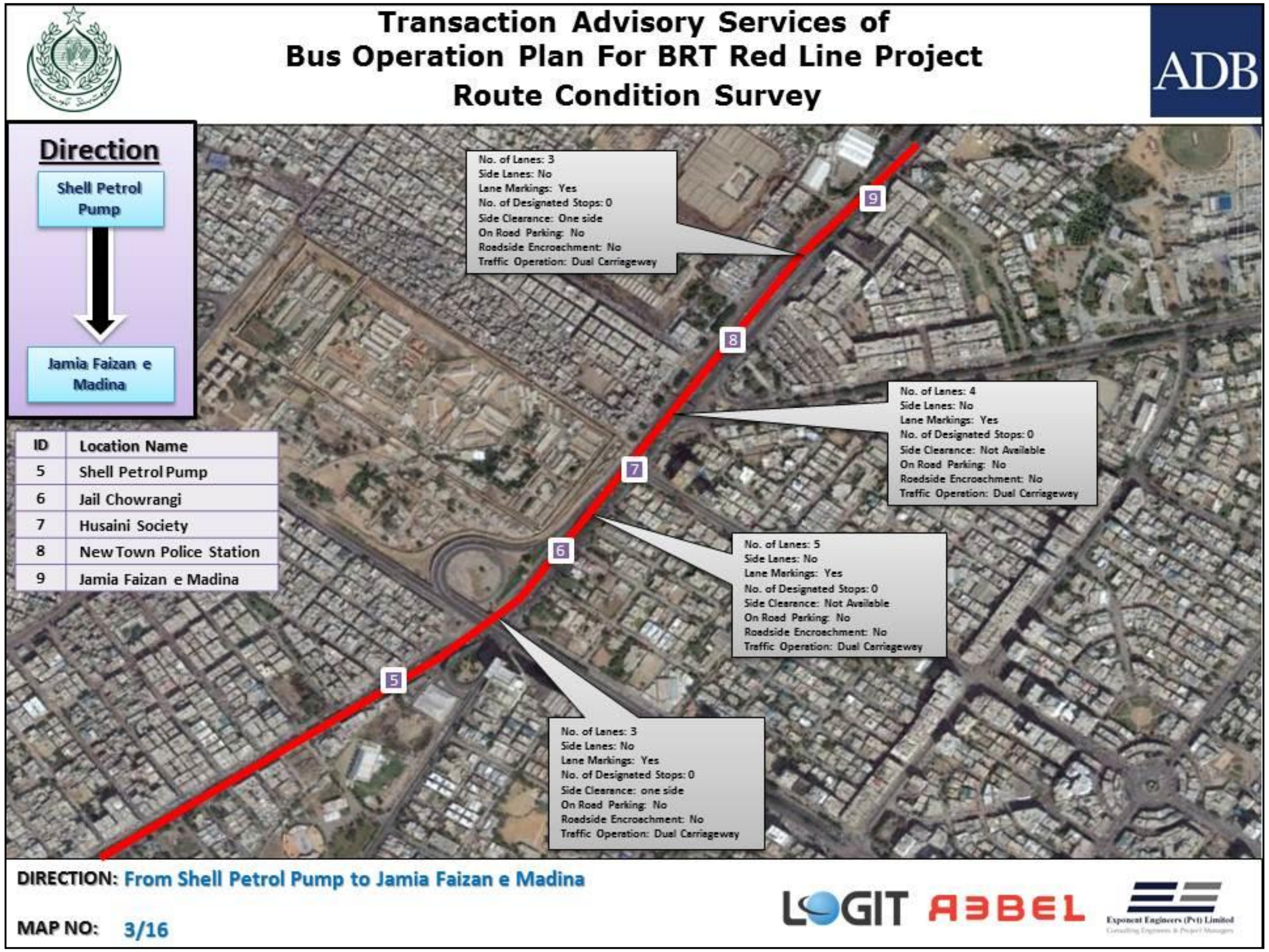
No. of Lanes: 3
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: one side
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

No. of Lanes: 2
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

DIRECTION: From PPP Sect. Chowrangi to Shell Petrol Pump

MAP NO: 2/16

Figure 3.188 (a) : Route Condition Survey Route 1-A (ii)



Transaction Advisory Services of
Bus Operation Plan For BRT Red Line Project
Route Condition Survey

ID	Location Name
5	Shell Petrol Pump
6	Jail Chowrangi
7	Husaini Society
8	New Town Police Station
9	Jamia Faizan e Madina

No. of Lanes: 3
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

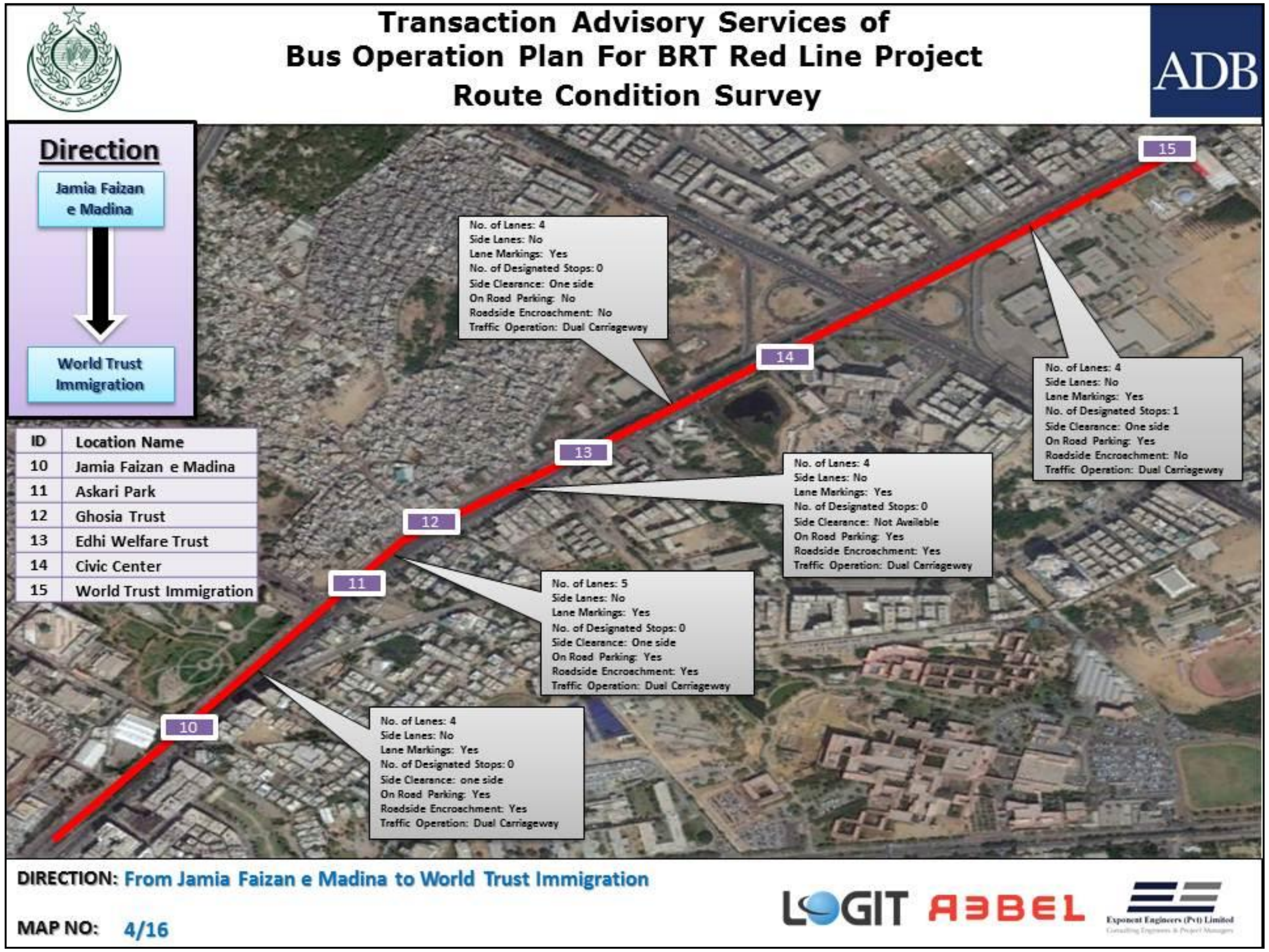
No. of Lanes: 5
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: one side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

DIRECTION: From Shell Petrol Pump to Jamia Faizan e Madina

MAP NO: 3/16

Figure 3.188 (b) : Route Condition Survey Route 1-A (iii)



Transaction Advisory Services of
Bus Operation Plan For BRT Red Line Project
Route Condition Survey

ID	Location Name
10	Jamia Faizan e Madina
11	Askari Park
12	Ghosia Trust
13	Edhi Welfare Trust
14	Civic Center
15	World Trust Immigration

No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: one side
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

No. of Lanes: 5
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

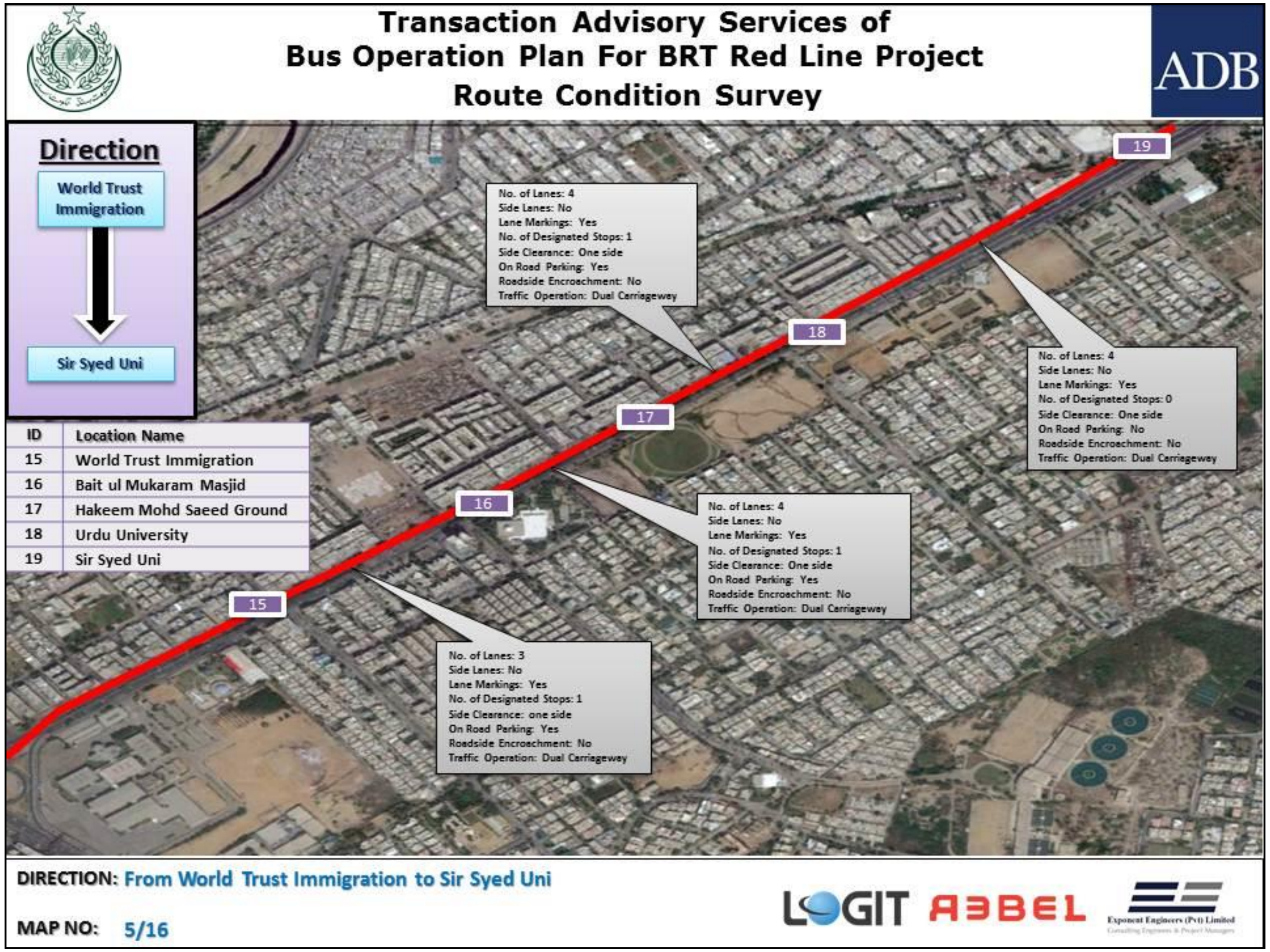
No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 1
Side Clearance: One side
On Road Parking: Yes
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

DIRECTION: From Jamia Faizan e Madina to World Trust Immigration

MAP NO: 4/16

Figure 3.188 (c) : Route Condition Survey Route 1-A (iv)



Transaction Advisory Services of
Bus Operation Plan For BRT Red Line Project
Route Condition Survey

ID	Location Name
15	World Trust Immigration
16	Bait ul Mukaram Masjid
17	Hakeem Mohd Saeed Ground
18	Urdu University
19	Sir Syed Uni

No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 1
Side Clearance: One side
On Road Parking: Yes
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

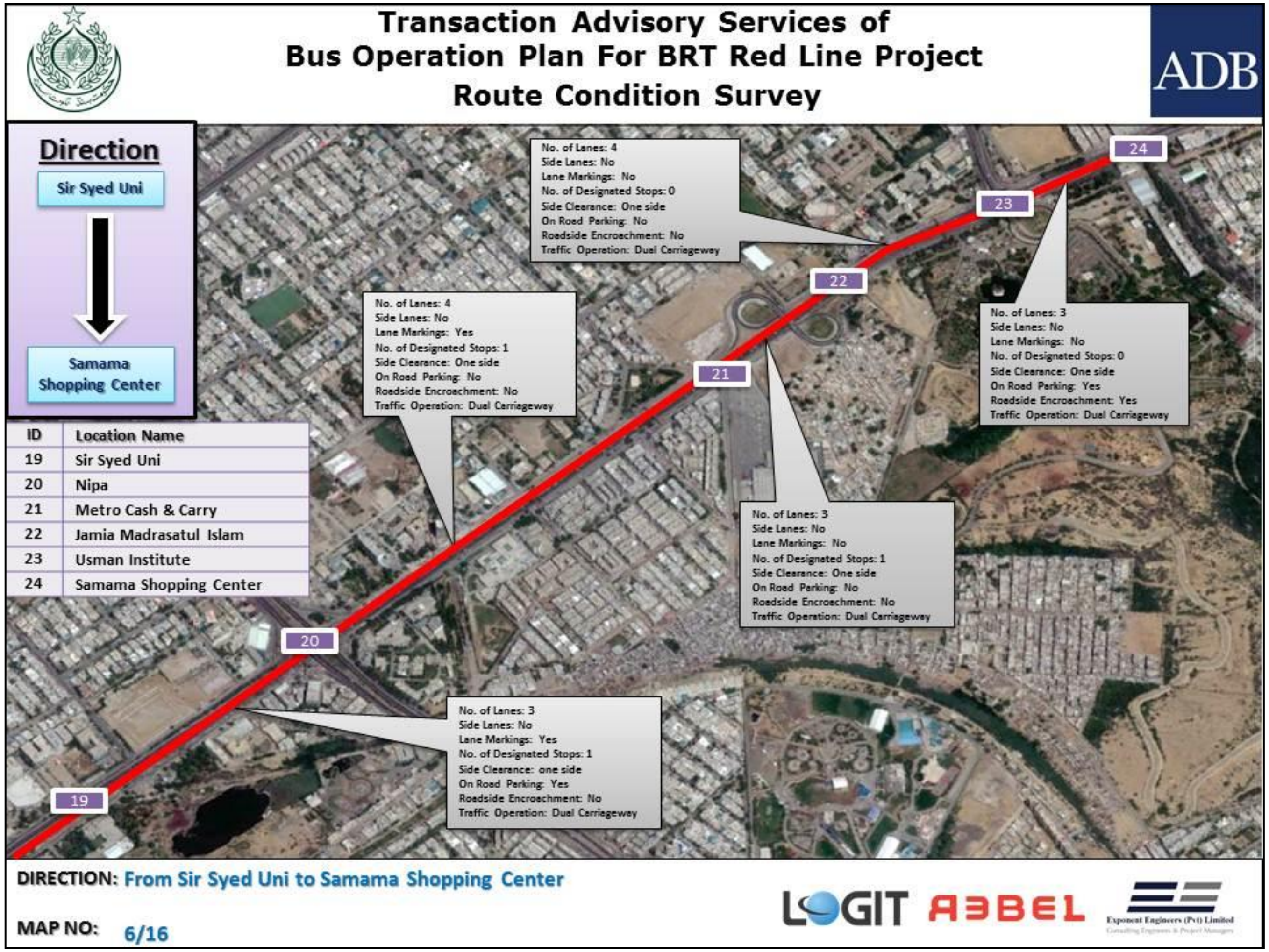
No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 1
Side Clearance: One side
On Road Parking: Yes
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 1
Side Clearance: one side
On Road Parking: Yes
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

DIRECTION: From World Trust Immigration to Sir Syed Uni

MAP NO: 5/16

Figure 3.188 (d) : Route Condition Survey Route 1-A (v)

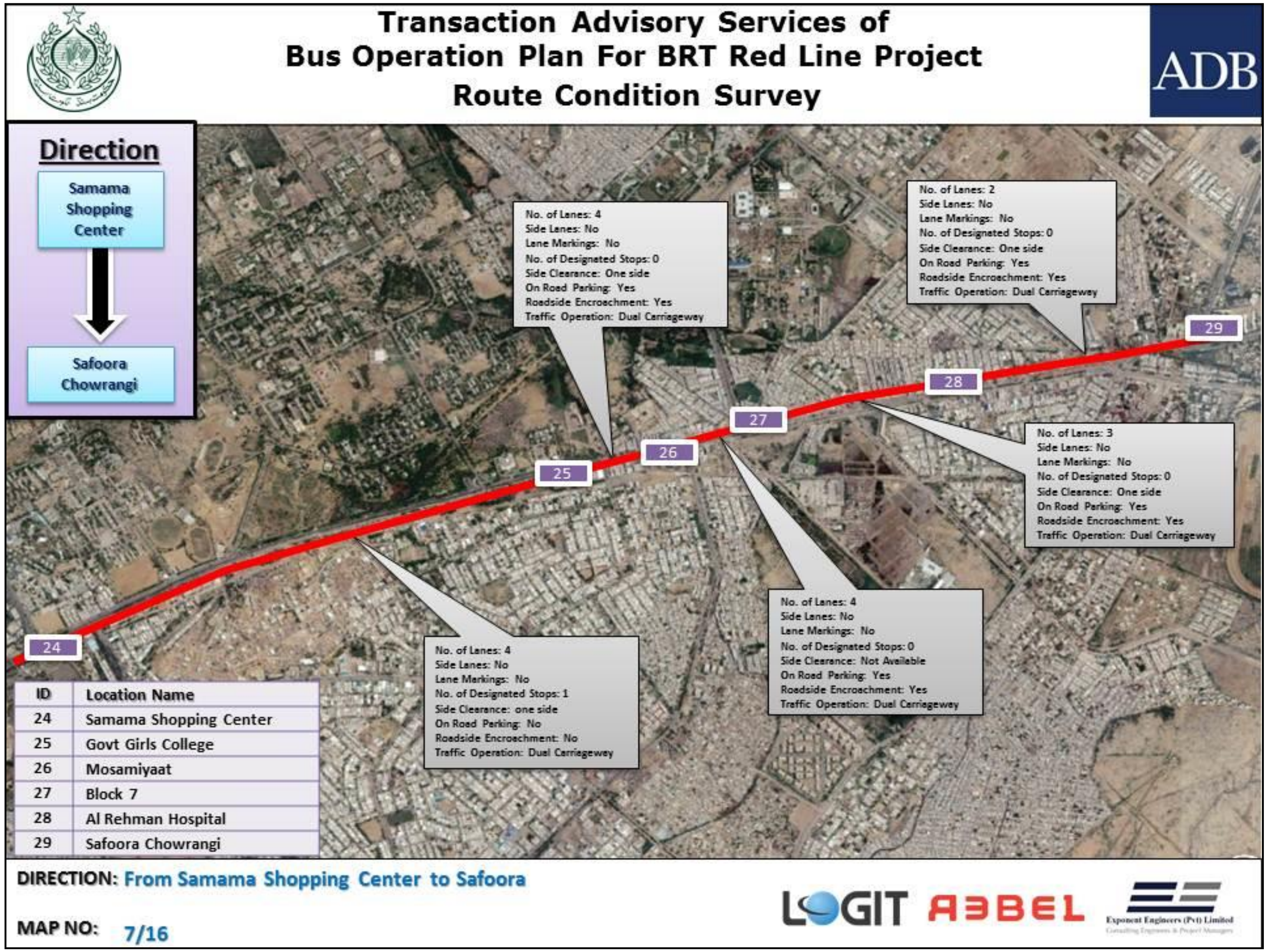


ID	Location Name
19	Sir Syed Uni
20	Nipa
21	Metro Cash & Carry
22	Jamia Madrasatul Islam
23	Usman Institute
24	Samama Shopping Center

DIRECTION: From Sir Syed Uni to Samama Shopping Center

MAP NO: 6/16

Figure 3.188 (e) : Route Condition Survey Route 1-A (vi)



Transaction Advisory Services of
Bus Operation Plan For BRT Red Line Project
Route Condition Survey

Direction
Samama Shopping Center
Safoora Chowrangi

No. of Lanes: 4
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

No. of Lanes: 2
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

No. of Lanes: 4
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

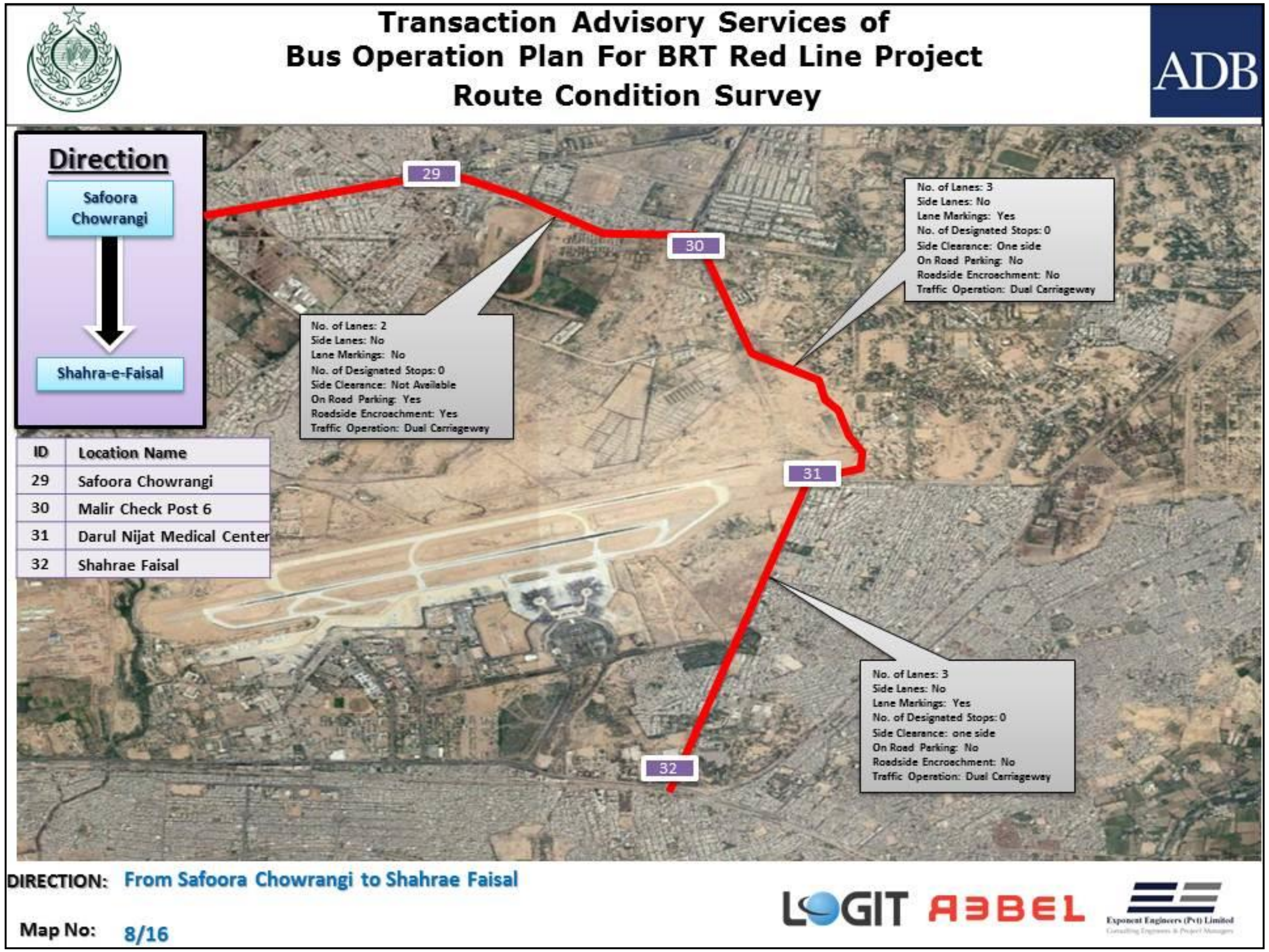
No. of Lanes: 4
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 1
Side Clearance: one side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

ID	Location Name
24	Samama Shopping Center
25	Govt Girls College
26	Mosamiyaat
27	Block 7
28	Al Rehman Hospital
29	Safoora Chowrangi

DIRECTION: From Samama Shopping Center to Safoora

MAP NO: 7/16

Figure 3.188 (f) : Route Condition Survey Route 1-A (vii)



Transaction Advisory Services of
Bus Operation Plan For BRT Red Line Project
Route Condition Survey

ID	Location Name
29	Safoora Chowrangi
30	Malir Check Post 6
31	Darul Nijat Medical Center
32	Shahrae Faisal

No. of Lanes: 2
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

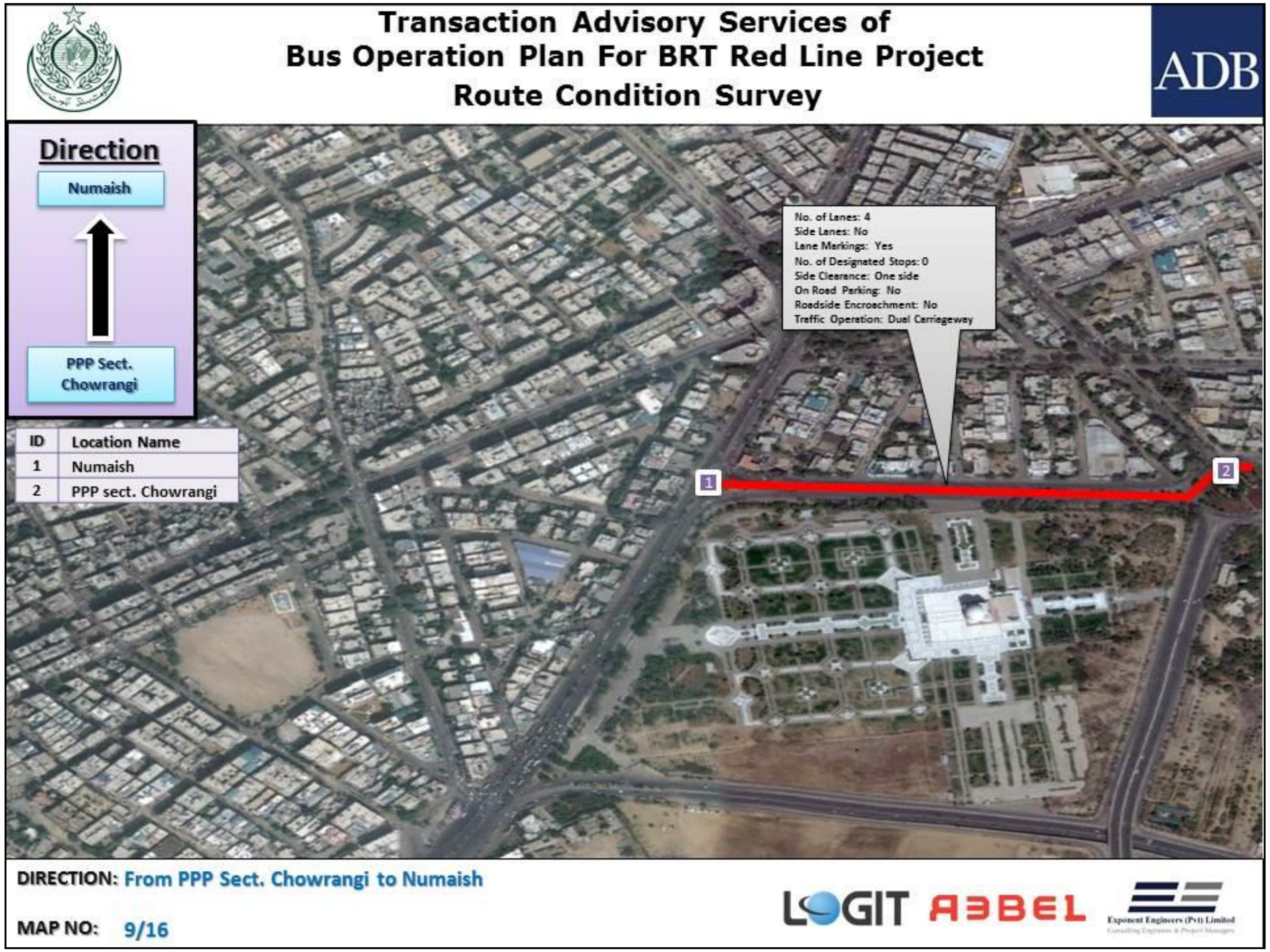
No. of Lanes: 3
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: one side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

DIRECTION: From Safoora Chowrangi to Shahrae Faisal

Map No: 8/16

Figure 3.188 (g) : Route Condition Survey Route 1-A (viii)


Transaction Advisory Services of
Bus Operation Plan For BRT Red Line Project
Route Condition Survey
ADB
Direction
Numaish
PPP Sect. Chowrangi
1
2
LOGIT
A3BEL
Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

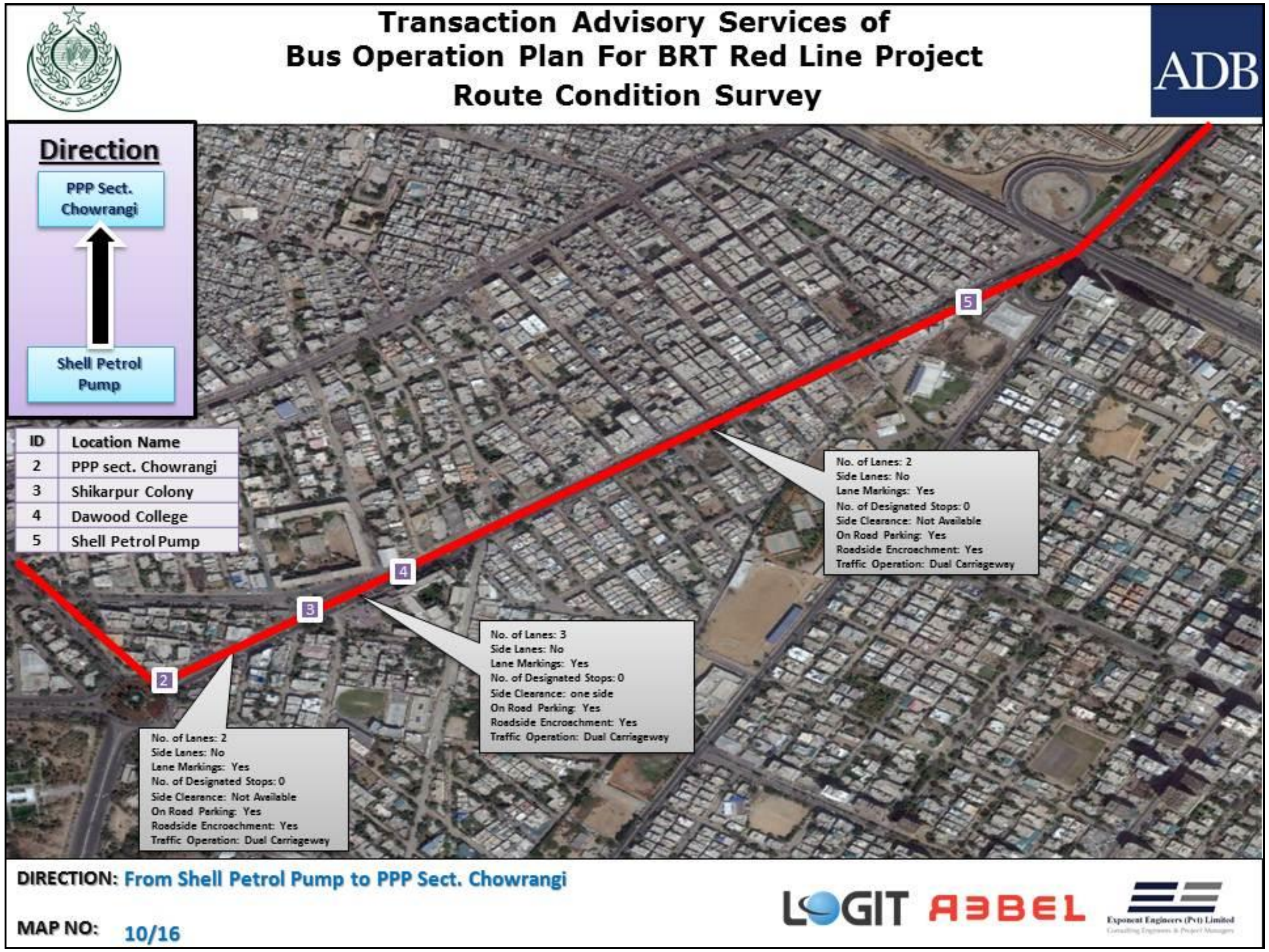
ID	Location Name
1	Numaish
2	PPP sect. Chowrangi

No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

DIRECTION: From PPP Sect. Chowrangi to Numaish

MAP NO: 9/16

Figure 3.188 (h) : Route Condition Survey Route 1-A (ix)



**Transaction Advisory Services of
Bus Operation Plan For BRT Red Line Project
Route Condition Survey**

ID	Location Name
2	PPP sect. Chowrangi
3	Shikarpur Colony
4	Dawood College
5	Shell Petrol Pump

No. of Lanes: 2
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

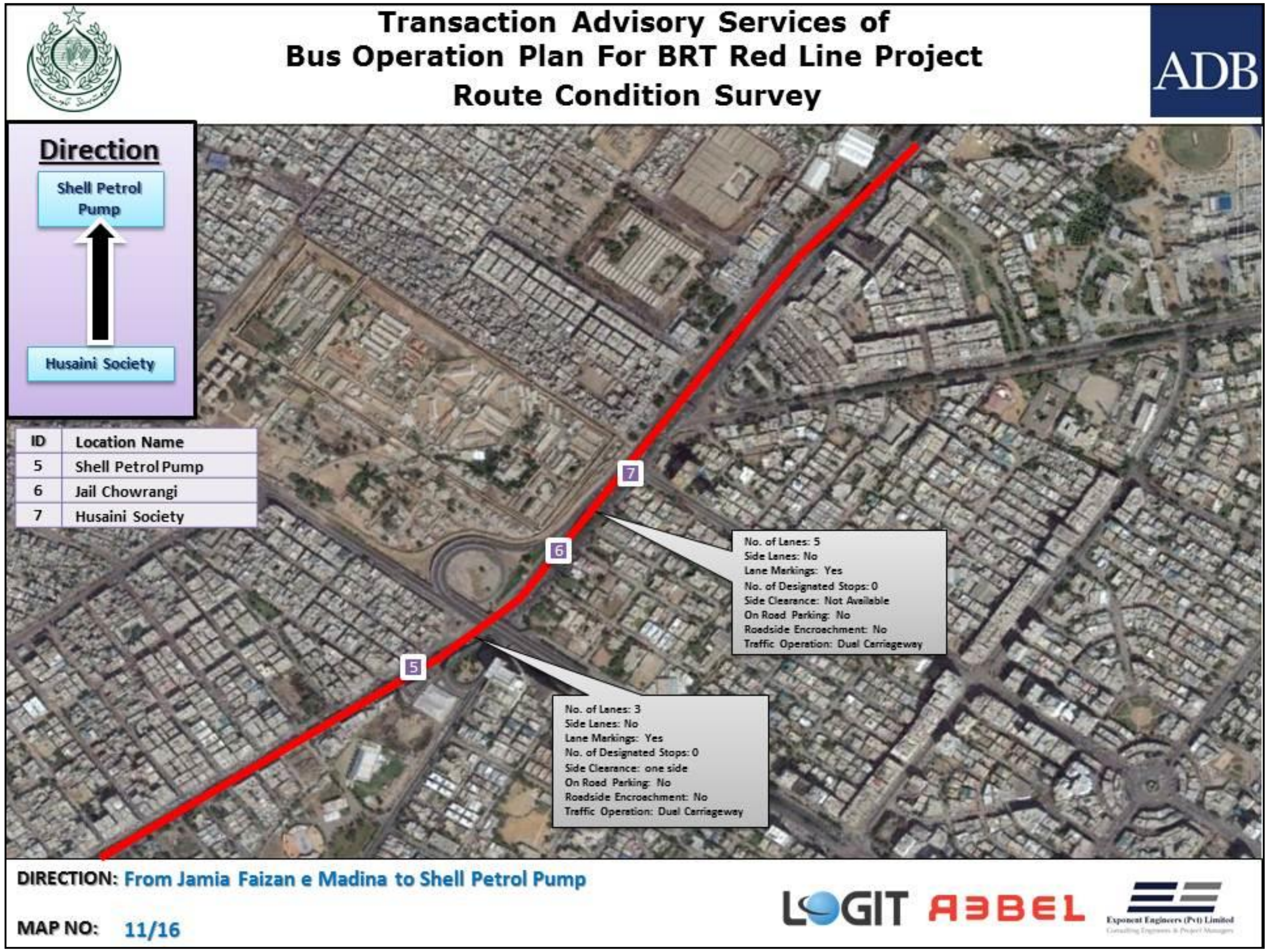
No. of Lanes: 3
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: one side
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

No. of Lanes: 2
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

DIRECTION: From Shell Petrol Pump to PPP Sect. Chowrangi

MAP NO: 10/16

Figure 3.188 (i) : Route Condition Survey Route 1-A (x)


Transaction Advisory Services of
Bus Operation Plan For BRT Red Line Project
Route Condition Survey
ADB
Direction
Shell Petrol Pump
Husaini Society
5
6
7
LOGIT
ABBEL
Exponent Engineers (Pvt) Limited

ID	Location Name
5	Shell Petrol Pump
6	Jail Chowrangi
7	Husaini Society

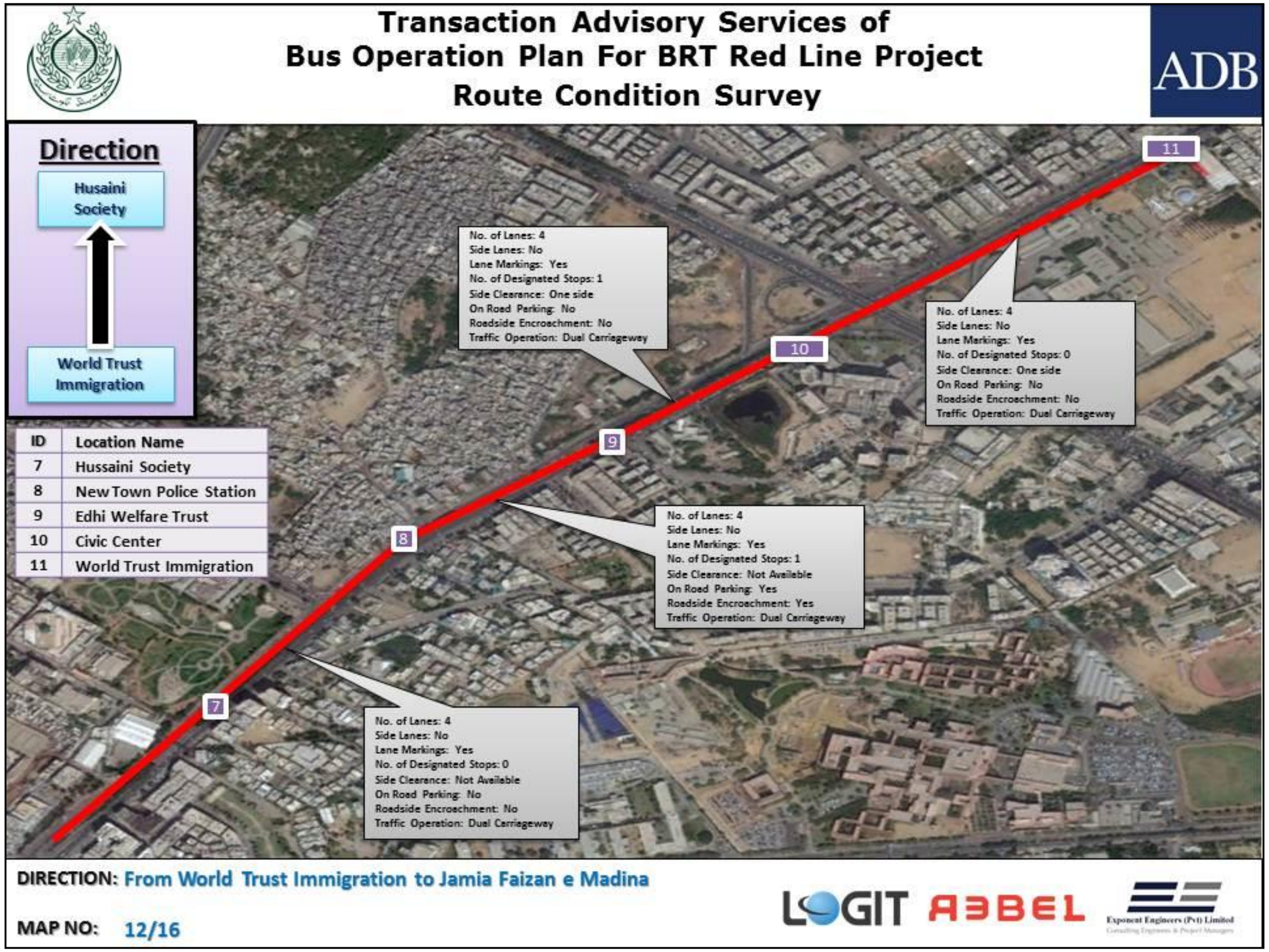
No. of Lanes: 5
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: one side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

DIRECTION: From Jamia Faizan e Madina to Shell Petrol Pump

MAP NO: 11/16

Figure 3.189: Route Condition Survey Route 1-B (i)



Transaction Advisory Services of
Bus Operation Plan For BRT Red Line Project
Route Condition Survey

ID	Location Name
7	Hussaini Society
8	New Town Police Station
9	Edhi Welfare Trust
10	Civic Center
11	World Trust Immigration

No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 1
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

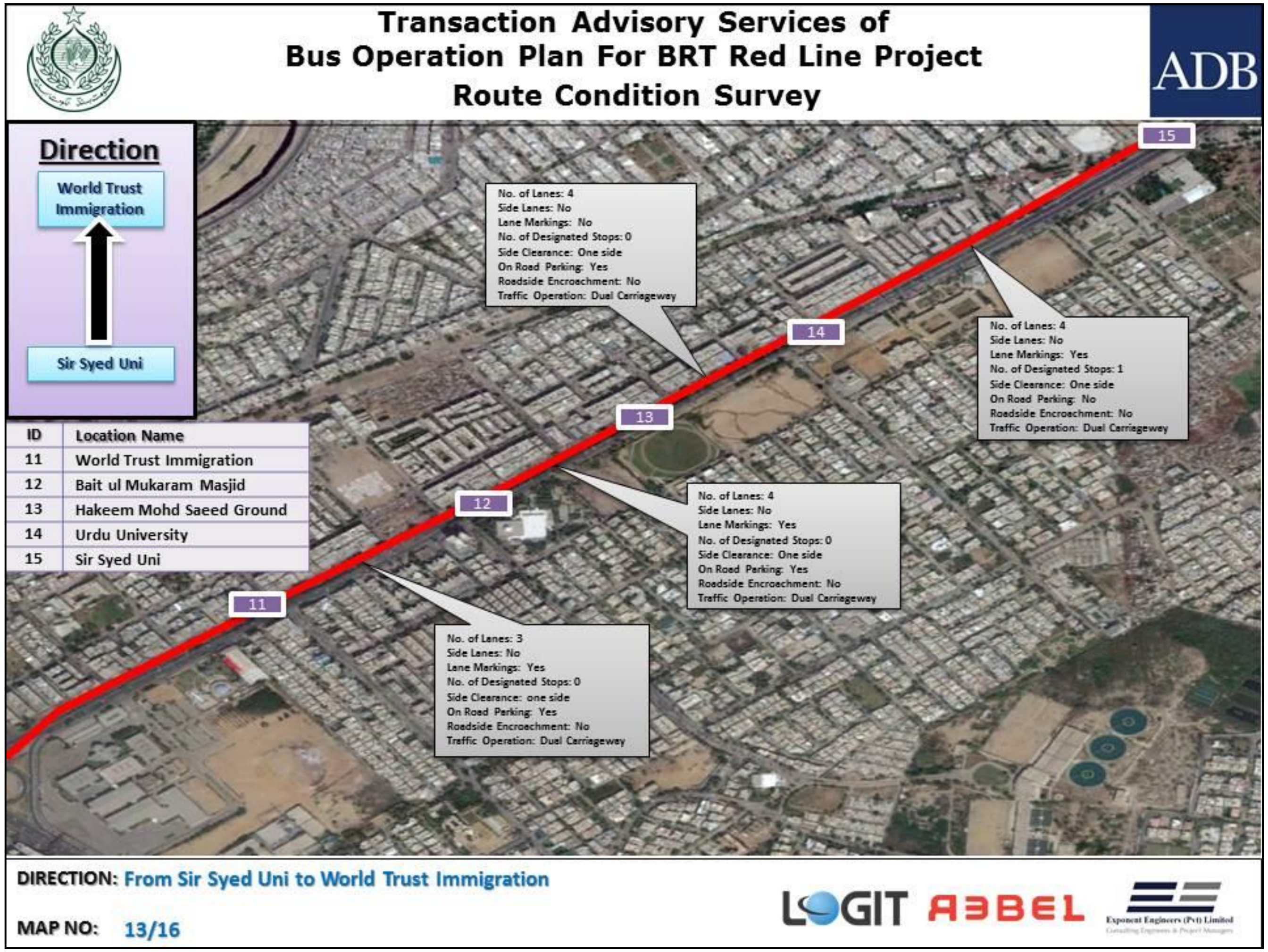
No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 1
Side Clearance: Not Available
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

DIRECTION: From World Trust Immigration to Jamia Faizan e Madina

MAP NO: 12/16

Figure 3.189 (a) : Route Condition Survey Route 1-B (ii)



Transaction Advisory Services of
Bus Operation Plan For BRT Red Line Project
Route Condition Survey

ID	Location Name
11	World Trust Immigration
12	Bait ul Mukaram Masjid
13	Hakeem Mohd Saeed Ground
14	Urdu University
15	Sir Syed Uni

No. of Lanes: 3
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: one side
On Road Parking: Yes
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: Yes
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

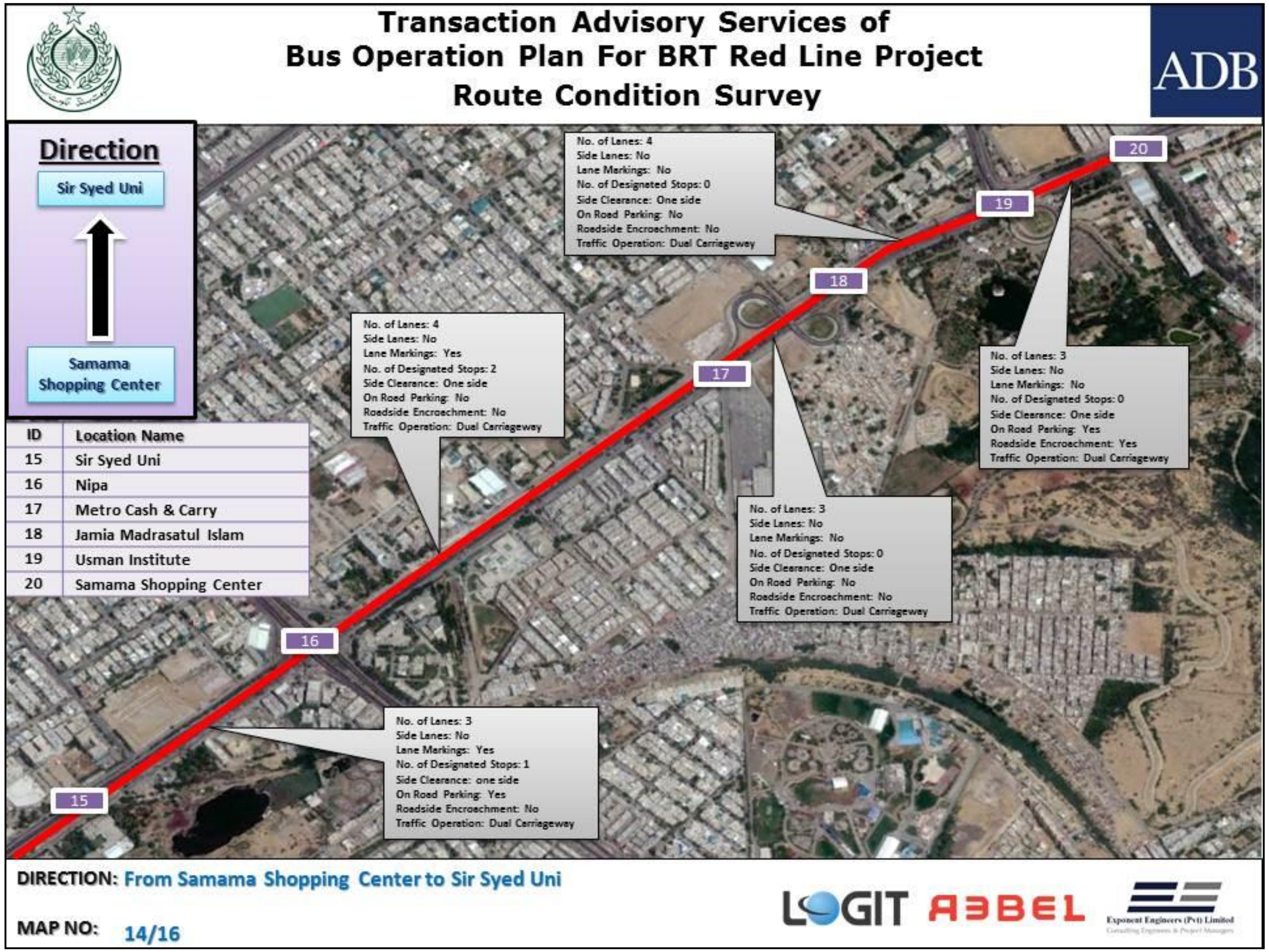
No. of Lanes: 4
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: Yes
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 1
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

DIRECTION: From Sir Syed Uni to World Trust Immigration

MAP NO: 13/16

Figure 3.189 (b) : Route Condition Survey Route 1-B (iii)



Transaction Advisory Services of
Bus Operation Plan For BRT Red Line Project
Route Condition Survey

ADB

Direction

Sir Syed Uni

Samama Shopping Center

ID	Location Name
15	Sir Syed Uni
16	Nipa
17	Metro Cash & Carry
18	Jamia Madrasatul Islam
19	Usman Institute
20	Samama Shopping Center

No. of Lanes: 4
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 2
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

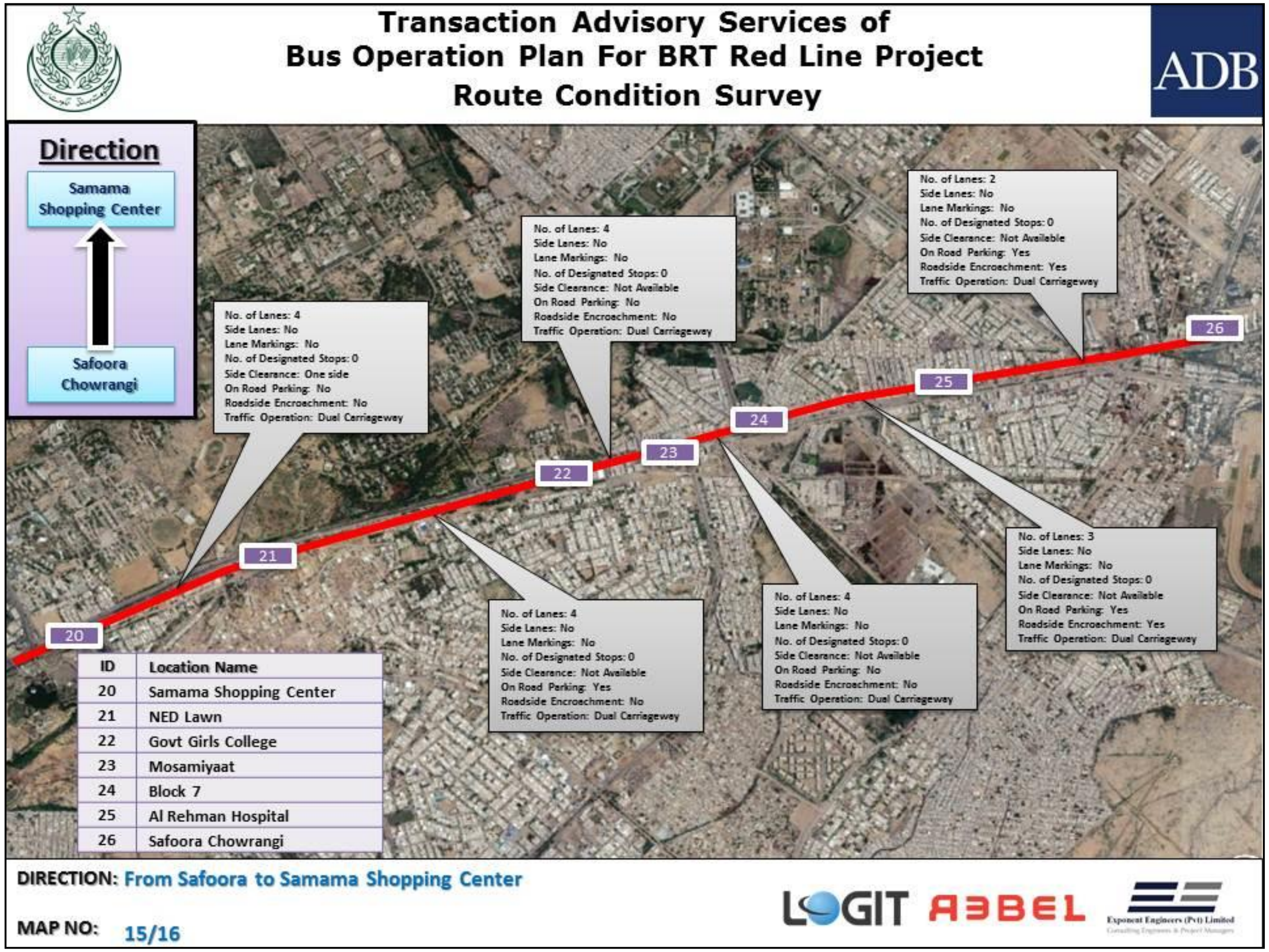
No. of Lanes: 3
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 1
Side Clearance: one side
On Road Parking: Yes
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

DIRECTION: From Samama Shopping Center to Sir Syed Uni

MAP NO: 14/16

Figure 3.189 (c) : Route Condition Survey Route 1-B (iv)



Transaction Advisory Services of
Bus Operation Plan For BRT Red Line Project
Route Condition Survey

No. of Lanes: 4
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 4
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: Yes
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 4
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 4
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

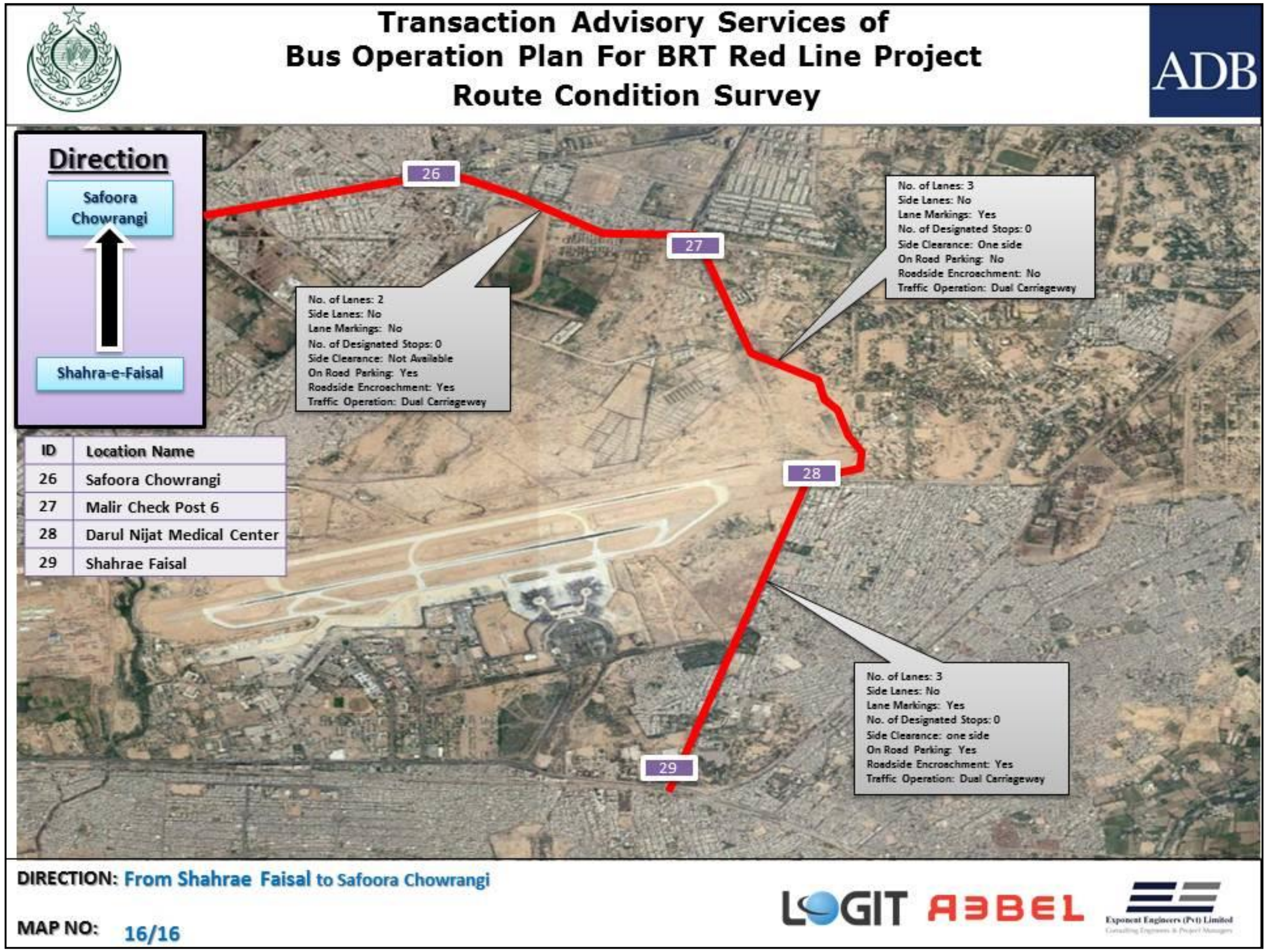
No. of Lanes: 2
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

ID	Location Name
20	Samama Shopping Center
21	NED Lawn
22	Govt Girls College
23	Mosamiyaat
24	Block 7
25	Al Rehman Hospital
26	Safoora Chowrangi

DIRECTION: From Safoora to Samama Shopping Center

MAP NO: 15/16

Figure 3.189 (d) : Route Condition Survey Route 1-B (v)



Transaction Advisory Services of
Bus Operation Plan For BRT Red Line Project
Route Condition Survey

ID	Location Name
26	Safoora Chowrangi
27	Malir Check Post 6
28	Darul Nijat Medical Center
29	Shahrae Faisal

No. of Lanes: 2
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: one side
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

DIRECTION: From Shahrae Faisal to Safoora Chowrangi

MAP NO: 16/16

Figure 3.189 (e) : Route Condition Survey Route 1-B (vi)

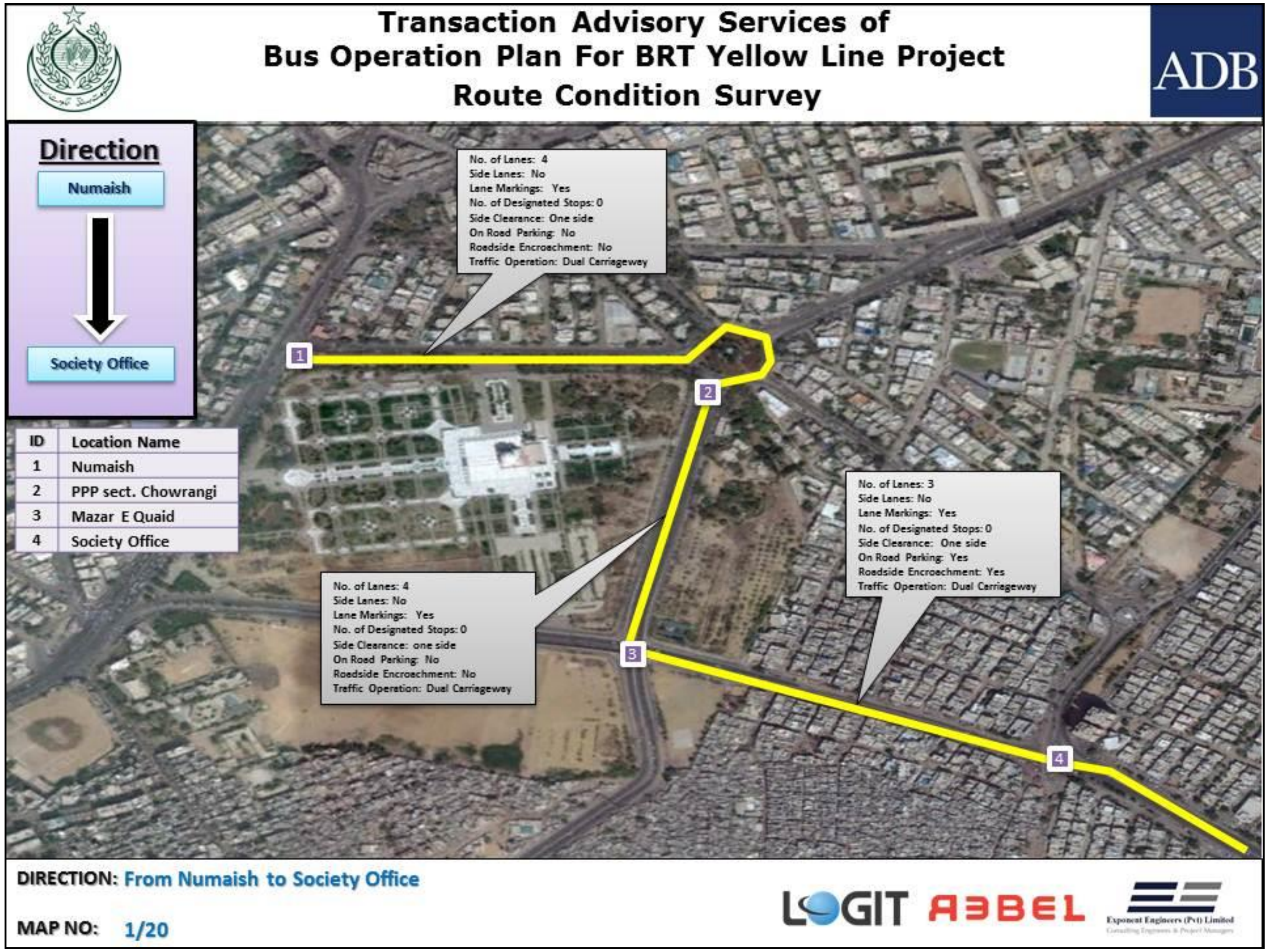
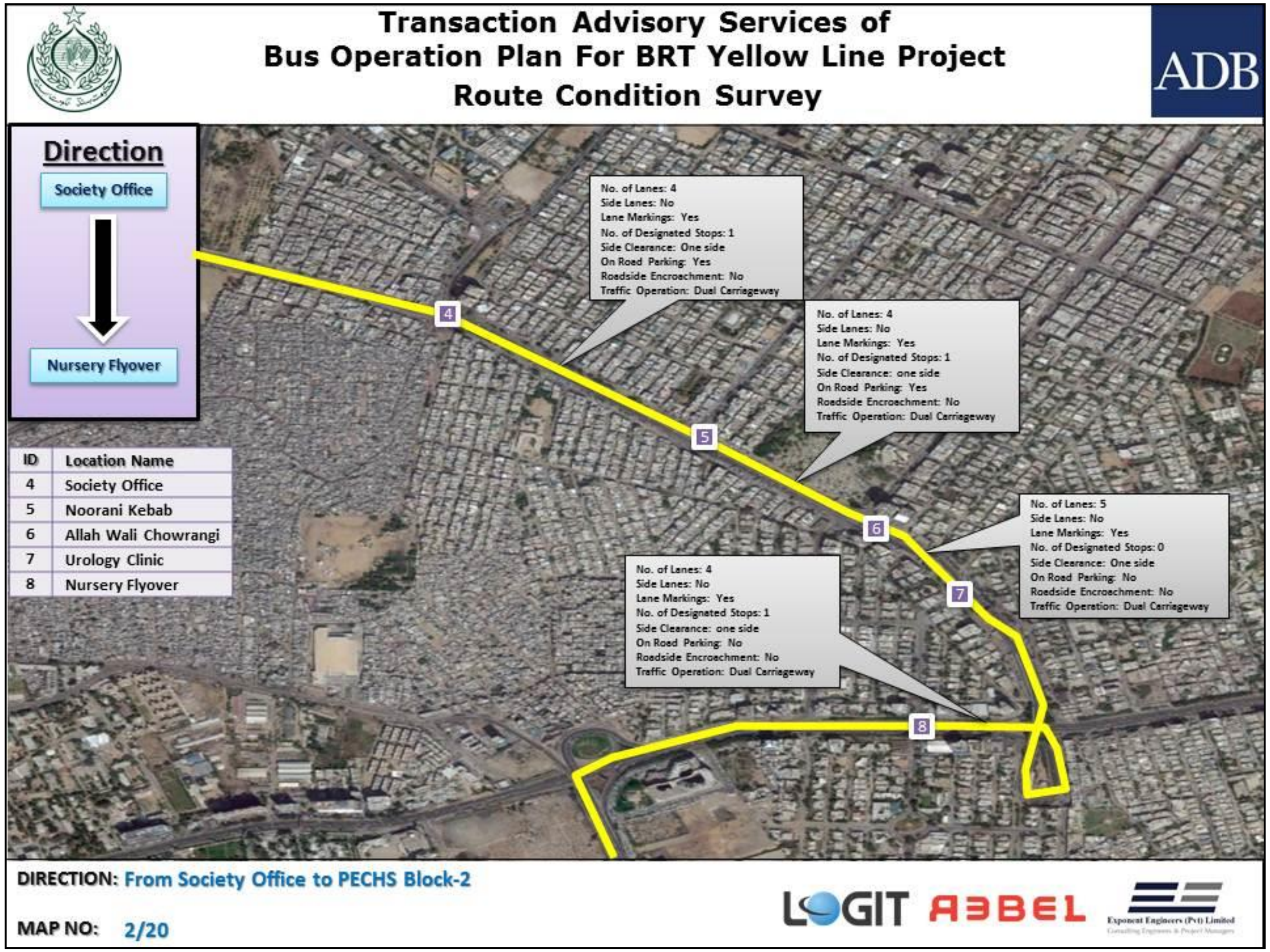


Figure 3.190: Route Condition Survey Route 1-C (i)



Transaction Advisory Services of
Bus Operation Plan For BRT Yellow Line Project
Route Condition Survey

Direction

Society Office

Nursery Flyover

ID	Location Name
4	Society Office
5	Noorani Kebab
6	Allah Wali Chowrangi
7	Urology Clinic
8	Nursery Flyover

No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 1
Side Clearance: One side
On Road Parking: Yes
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 1
Side Clearance: one side
On Road Parking: Yes
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 5
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 1
Side Clearance: one side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

DIRECTION: From Society Office to PECHS Block-2

MAP NO: 2/20

Figure 3.190 (a) : Route Condition Survey Route 1-C (ii)

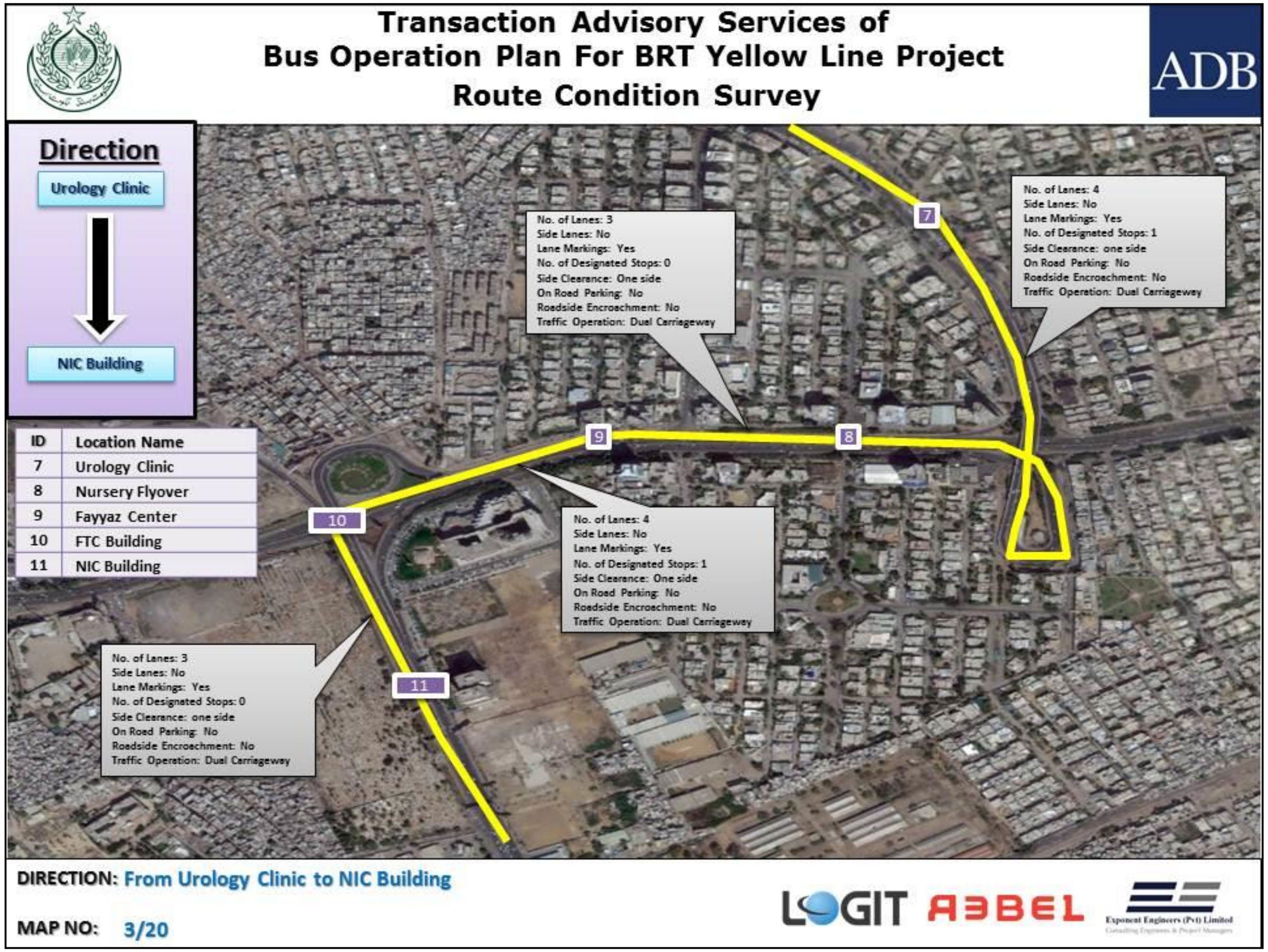
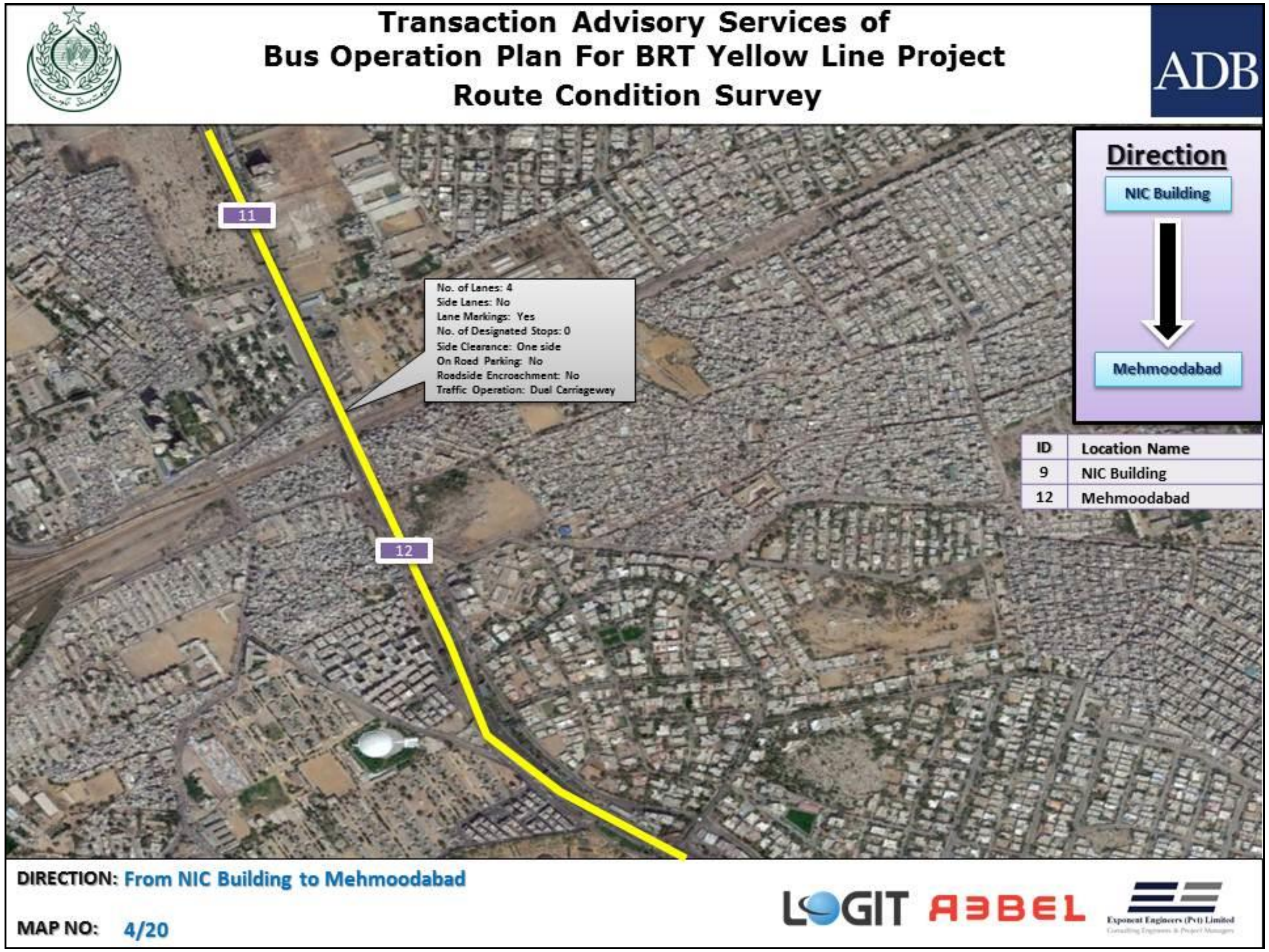


Figure 3.190 (b) : Route Condition Survey Route 1-C (iii)



Transaction Advisory Services of
Bus Operation Plan For BRT Yellow Line Project
Route Condition Survey

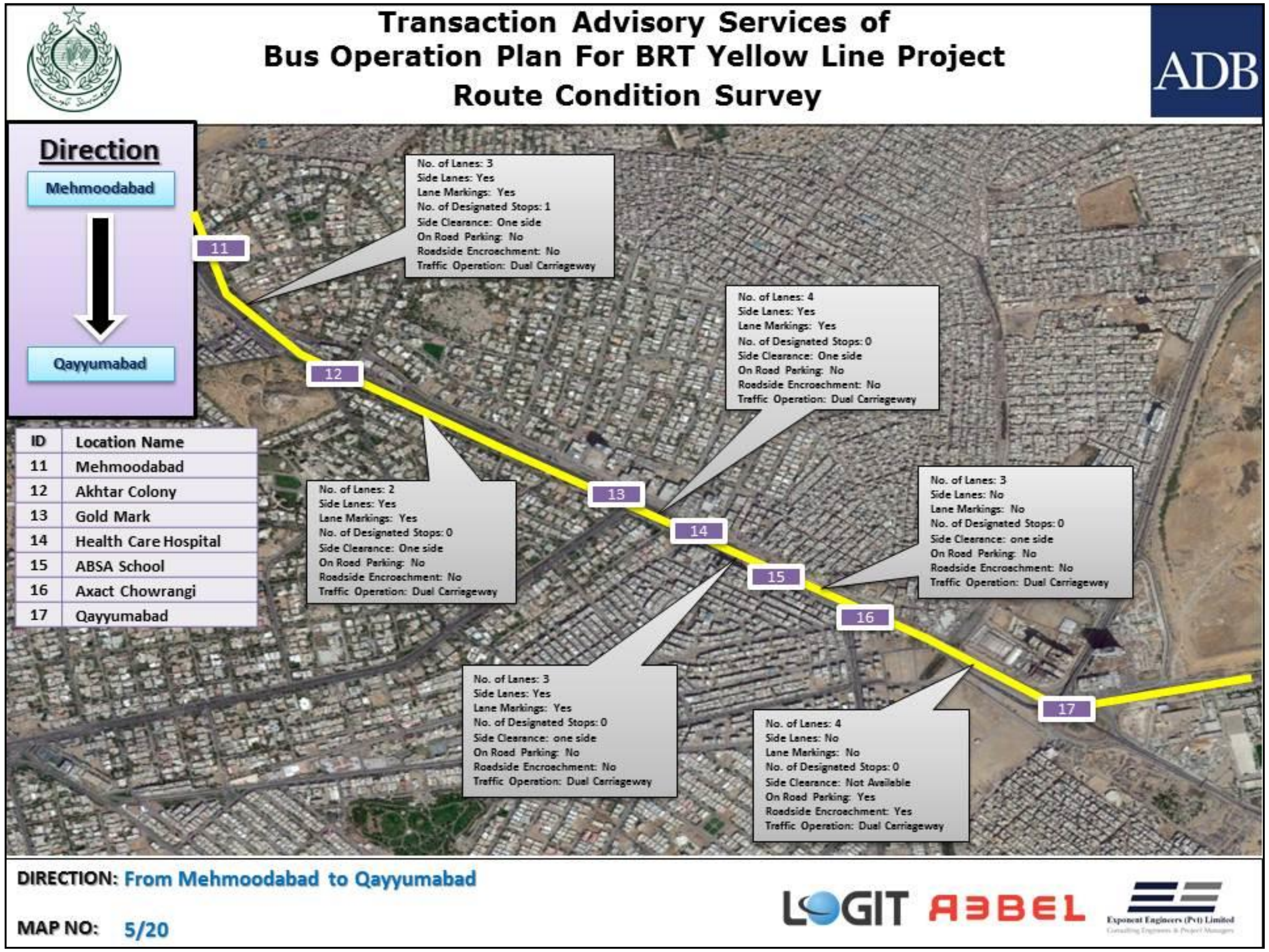
No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

ID	Location Name
9	NIC Building
12	Mehmoodabad

DIRECTION: From NIC Building to Mehmoodabad

MAP NO: 4/20

Figure 3.190 (c) : Route Condition Survey Route 1-C (iv)



Transaction Advisory Services of
Bus Operation Plan For BRT Yellow Line Project
Route Condition Survey

ID	Location Name
11	Mehmoodabad
12	Akhtar Colony
13	Gold Mark
14	Health Care Hospital
15	ABSA School
16	Axact Chowrangi
17	Qayyumabad

No. of Lanes: 3
Side Lanes: Yes
Lane Markings: Yes
No. of Designated Stops: 1
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 4
Side Lanes: Yes
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: one side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 2
Side Lanes: Yes
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: Yes
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: one side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 4
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

DIRECTION: From Mehmoodabad to Qayyumabad

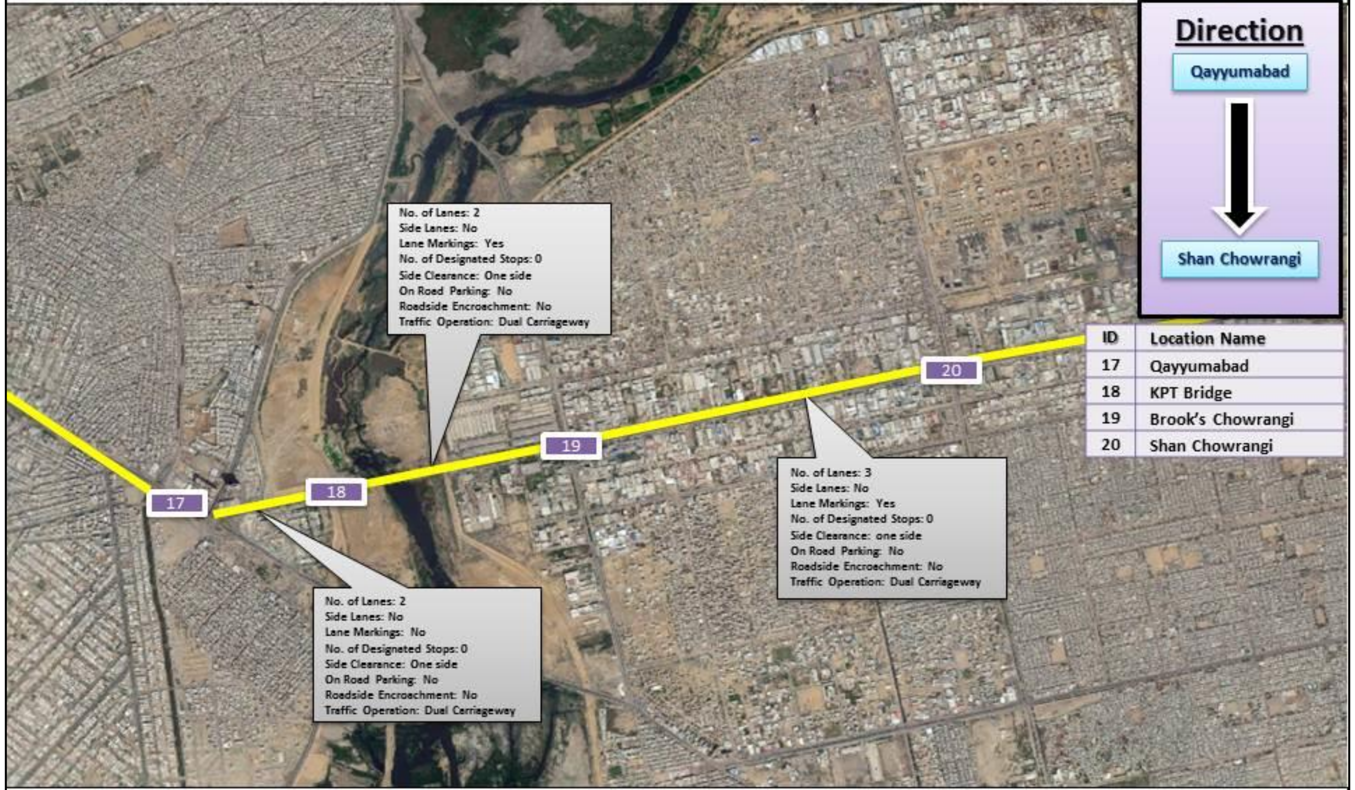
MAP NO: 5/20

LOGIT
A3BEL
Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

Figure 3.190 (d) : Route Condition Survey Route 1-C (v)

Transaction Advisory Services of
Bus Operation Plan For BRT Yellow Line Project
Route Condition Survey

ADB



No. of Lanes: 2
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: one side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 2
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

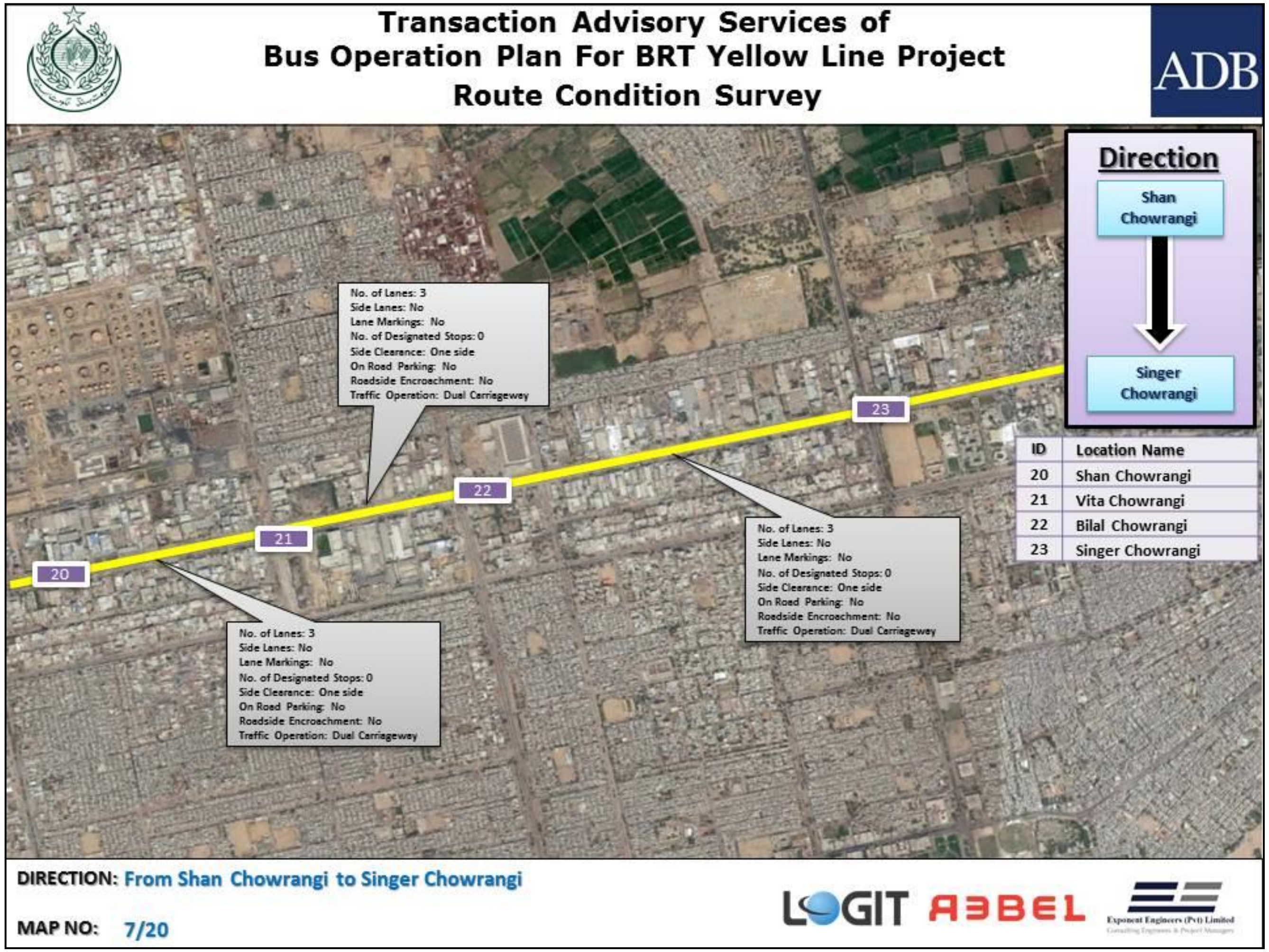
ID	Location Name
17	Qayyumabad
18	KPT Bridge
19	Brook's Chowrangi
20	Shan Chowrangi

DIRECTION: From Qayyumabad to Shan Chowrangi

MAP NO: 6/20

LOGIT ABBEL Exponent Engineers (Pvt) Limited

Figure 3.190 (e) : Route Condition Survey Route 1-C (vi)



Transaction Advisory Services of
Bus Operation Plan For BRT Yellow Line Project
Route Condition Survey

No. of Lanes: 3
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

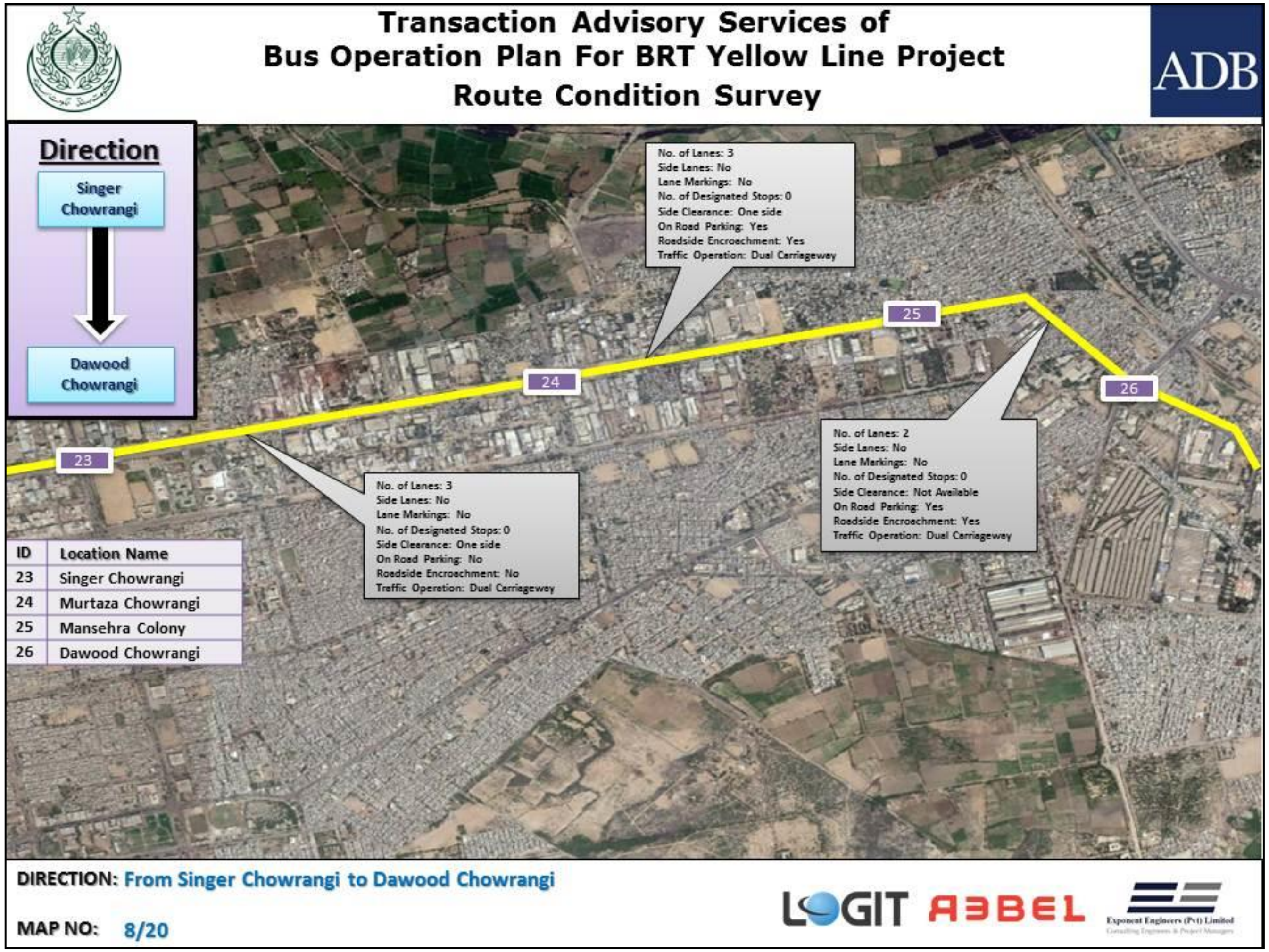
No. of Lanes: 3
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

ID	Location Name
20	Shan Chowrangi
21	Vita Chowrangi
22	Bilal Chowrangi
23	Singer Chowrangi

DIRECTION: From Shan Chowrangi to Singer Chowrangi

MAP NO: 7/20

Figure 3.190: Route Condition Survey Route 1-D (i)



Transaction Advisory Services of
Bus Operation Plan For BRT Yellow Line Project
Route Condition Survey

Direction

Singer Chowrangi → Dawood Chowrangi

ID	Location Name
23	Singer Chowrangi
24	Murtaza Chowrangi
25	Mansehra Colony
26	Dawood Chowrangi

No. of Lanes: 3
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 2
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

DIRECTION: From Singer Chowrangi to Dawood Chowrangi

MAP NO: 8/20

ADB
23
24
25
26
LOGIT
ABBEL
Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

Figure 3.190 (a) : Route Condition Survey Route 1-D (ii)

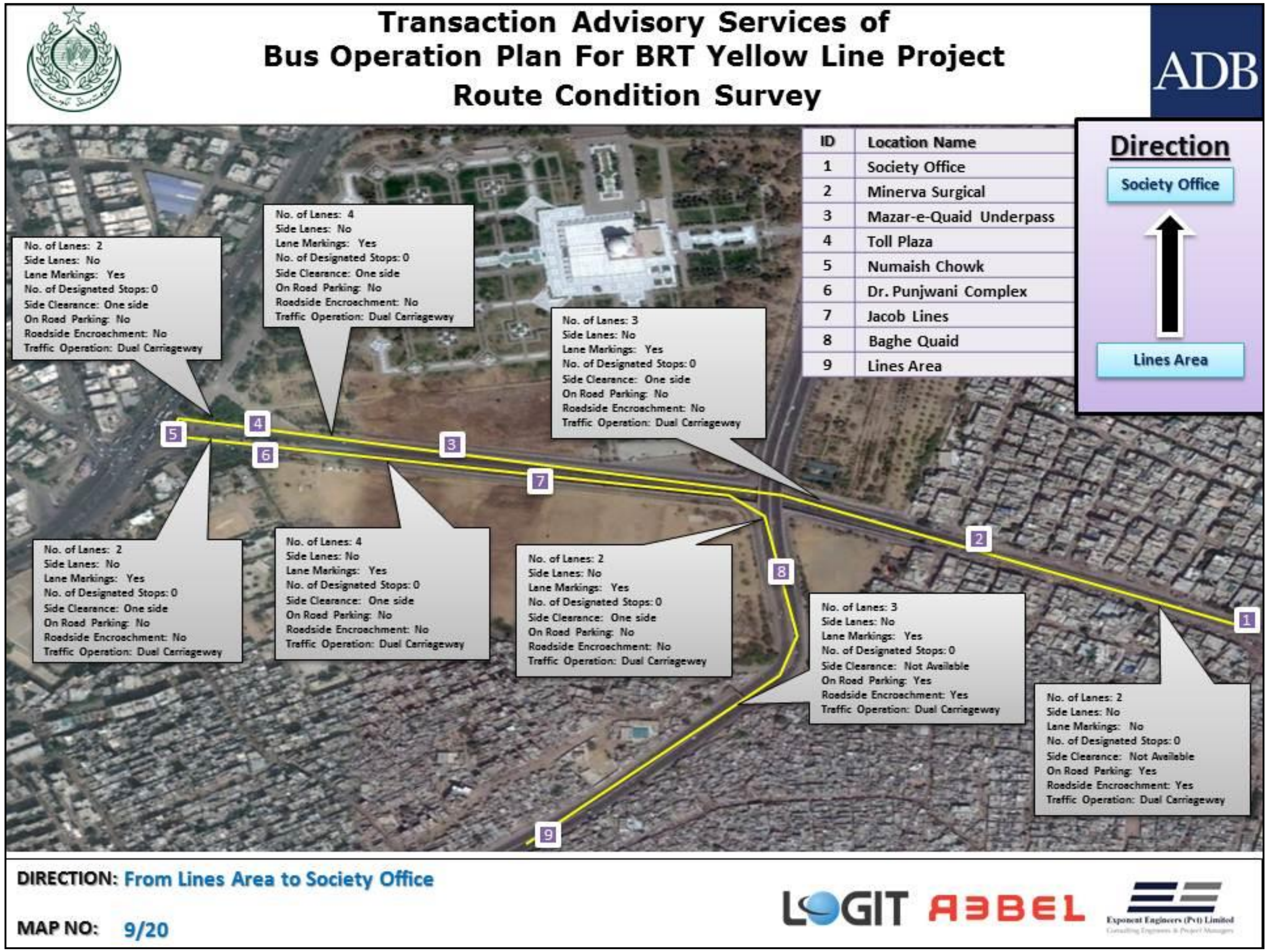
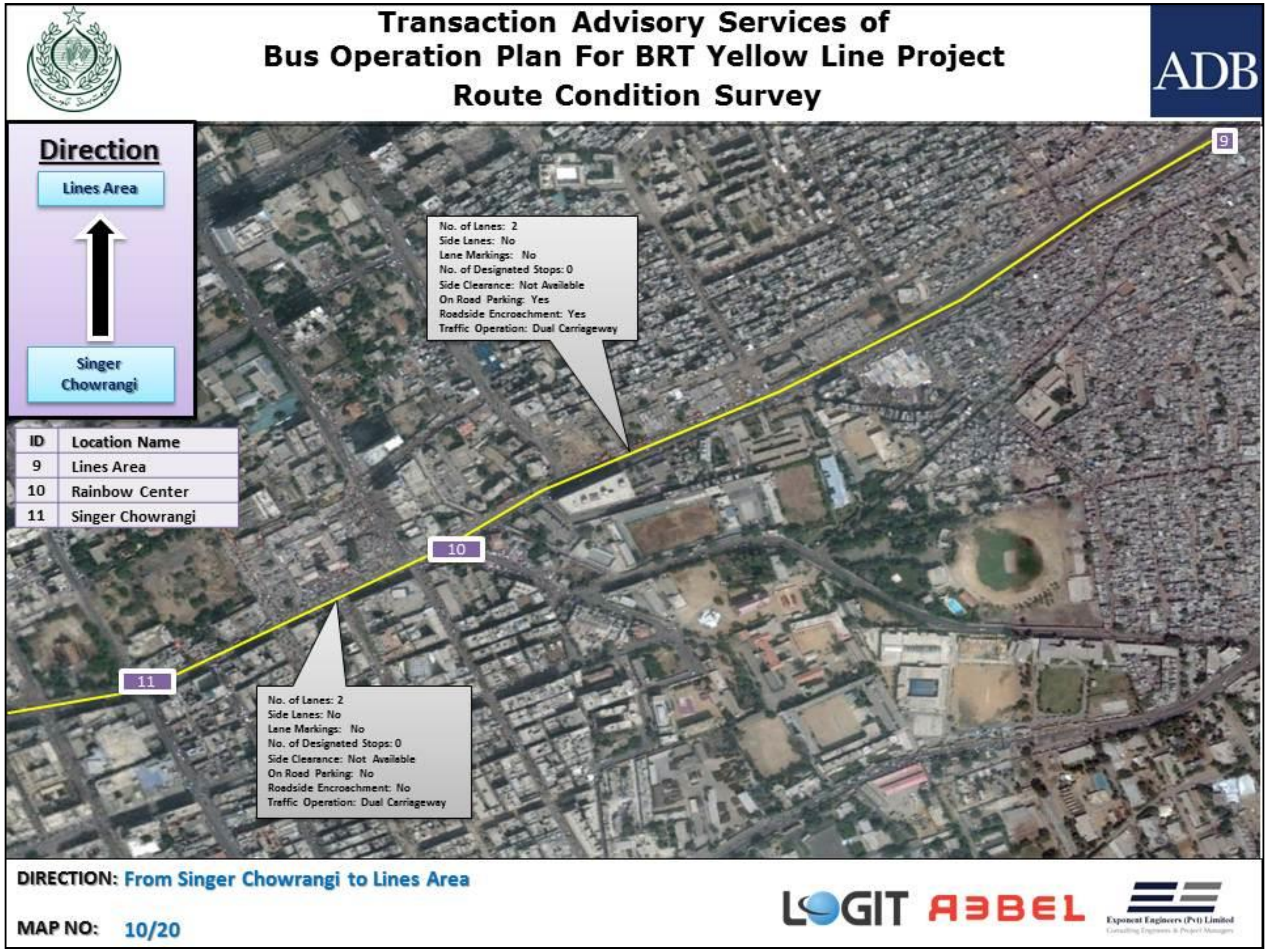

Transaction Advisory Services of
Bus Operation Plan For BRT Yellow Line Project
Route Condition Survey
ADB
ID | Location Name
1 Society Office
2 Minerva Surgical
3 Mazar-e-Quaid Underpass
4 Toll Plaza
5 Numaish Chowk
6 Dr. Punjwani Complex
7 Jacob Lines
8 Baghe Quaid
9 Lines Area
Direction
Society Office
Lines Area
No. of Lanes: 2 Side Lanes: No Lane Markings: Yes No. of Designated Stops: 0 Side Clearance: One side On Road Parking: No Roadside Encroachment: No Traffic Operation: Dual Carriageway
No. of Lanes: 4 Side Lanes: No Lane Markings: Yes No. of Designated Stops: 0 Side Clearance: One side On Road Parking: No Roadside Encroachment: No Traffic Operation: Dual Carriageway
No. of Lanes: 3 Side Lanes: No Lane Markings: Yes No. of Designated Stops: 0 Side Clearance: One side On Road Parking: No Roadside Encroachment: No Traffic Operation: Dual Carriageway
No. of Lanes: 2 Side Lanes: No Lane Markings: Yes No. of Designated Stops: 0 Side Clearance: One side On Road Parking: No Roadside Encroachment: No Traffic Operation: Dual Carriageway
No. of Lanes: 4 Side Lanes: No Lane Markings: Yes No. of Designated Stops: 0 Side Clearance: One side On Road Parking: No Roadside Encroachment: No Traffic Operation: Dual Carriageway
No. of Lanes: 2 Side Lanes: No Lane Markings: Yes No. of Designated Stops: 0 Side Clearance: One side On Road Parking: No Roadside Encroachment: No Traffic Operation: Dual Carriageway
No. of Lanes: 3 Side Lanes: No Lane Markings: Yes No. of Designated Stops: 0 Side Clearance: Not Available On Road Parking: Yes Roadside Encroachment: Yes Traffic Operation: Dual Carriageway
No. of Lanes: 2 Side Lanes: No Lane Markings: No No. of Designated Stops: 0 Side Clearance: Not Available On Road Parking: Yes Roadside Encroachment: Yes Traffic Operation: Dual Carriageway
1
2
3
4
5
6
7
8
9
DIRECTION: From Lines Area to Society Office
MAP NO: 9/20
LOGIT ABBEL Exponent Engineers (Pvt) Limited

Figure 3.190 (b) : Route Condition Survey Route 1-D (iii)



Transaction Advisory Services of
Bus Operation Plan For BRT Yellow Line Project
Route Condition Survey

ID	Location Name
9	Lines Area
10	Rainbow Center
11	Singer Chowrangi

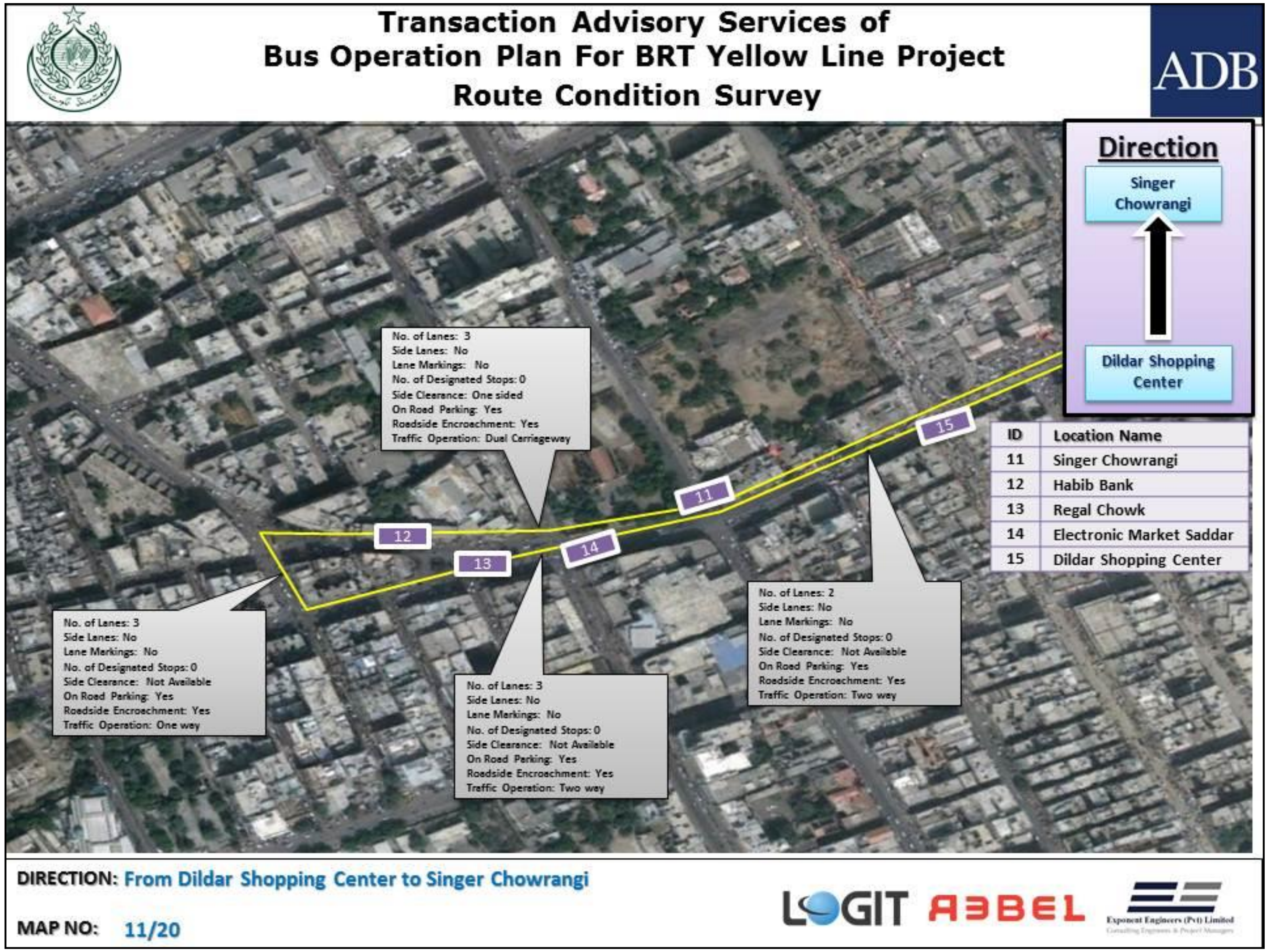
No. of Lanes: 2
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

No. of Lanes: 2
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

DIRECTION: From Singer Chowrangi to Lines Area

MAP NO: 10/20

Figure 3.190 (c) : Route Condition Survey Route 1-D (iv)



Transaction Advisory Services of
Bus Operation Plan For BRT Yellow Line Project
Route Condition Survey

ID	Location Name
11	Singer Chowrangi
12	Habib Bank
13	Regal Chowk
14	Electronic Market Saddar
15	Dildar Shopping Center

No. of Lanes: 3
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: One sided
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: One way

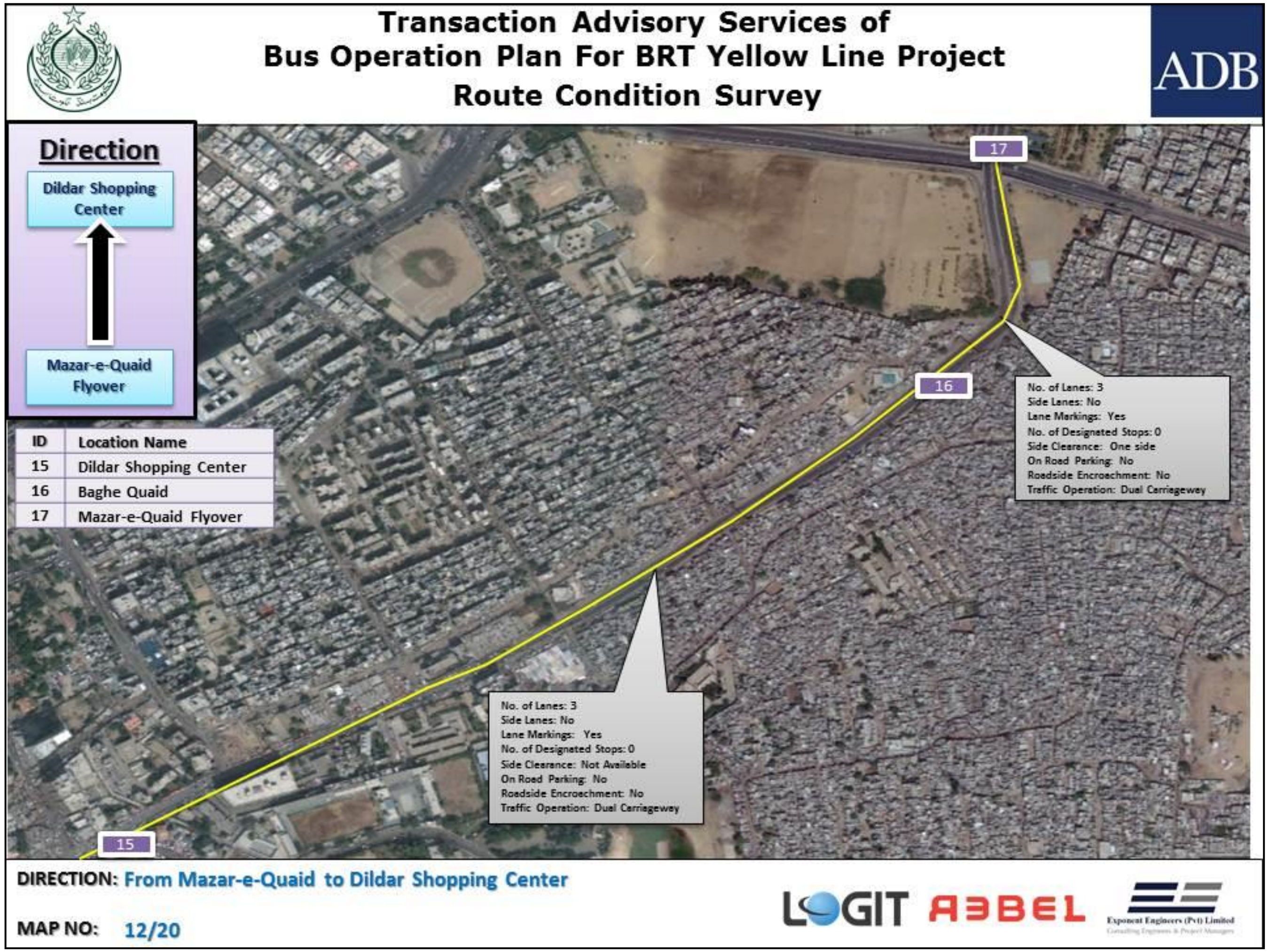
No. of Lanes: 3
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Two way

No. of Lanes: 2
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Two way

DIRECTION: From Dildar Shopping Center to Singer Chowrangi

MAP NO: 11/20

Figure 3.190 (d) : Route Condition Survey Route 1-D (v)


Transaction Advisory Services of
Bus Operation Plan For BRT Yellow Line Project
Route Condition Survey
ADB
Direction
Dildar Shopping Center
Mazar-e-Quaid Flyover
17
16
15
DIRECTION: From Mazar-e-Quaid to Dildar Shopping Center
MAP NO: 12/20
LOGIT
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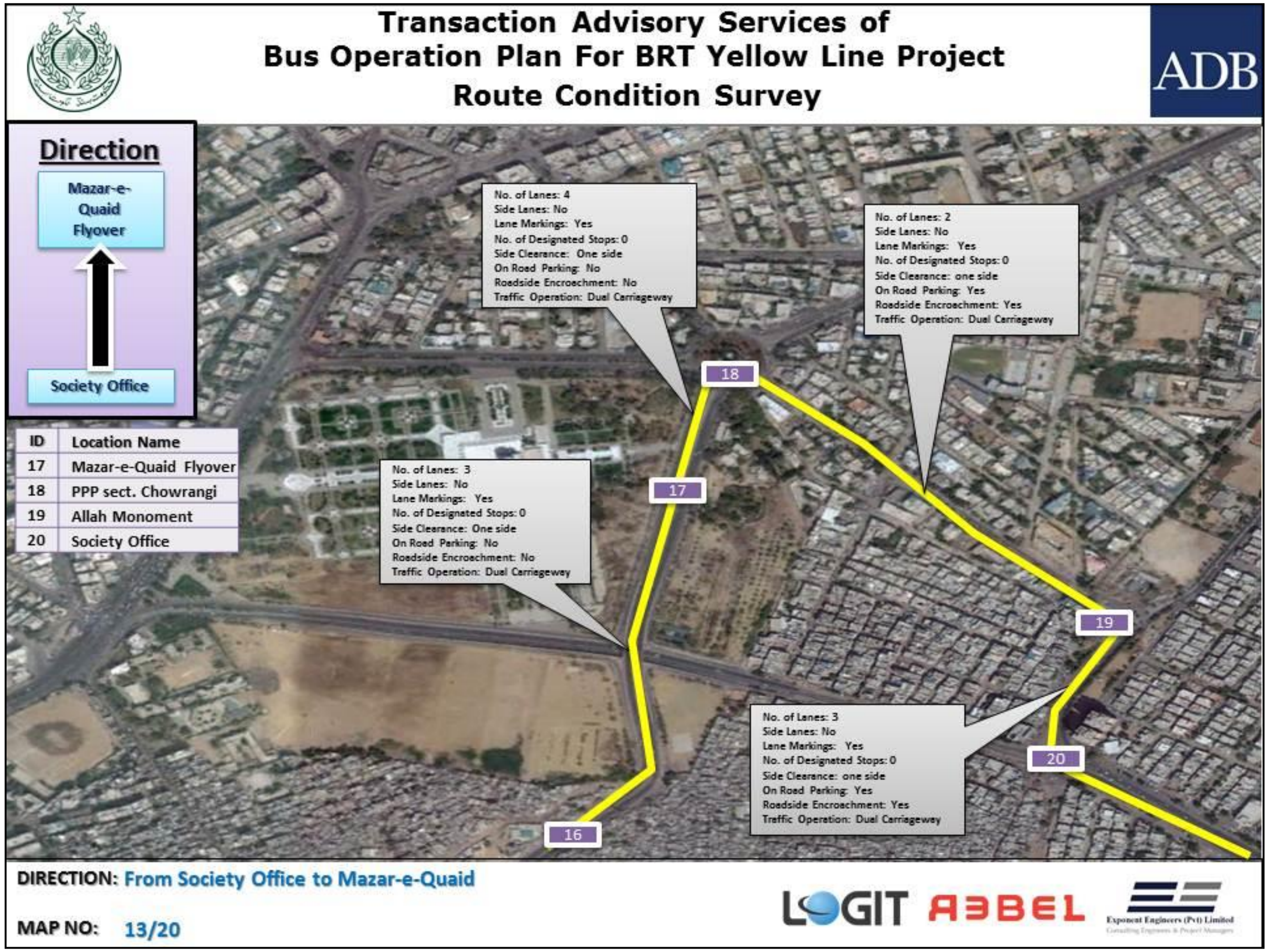
ID	Location Name
15	Dildar Shopping Center
16	Baghe Quaid
17	Mazar-e-Quaid Flyover

No. of Lanes: 3
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

Figure 3.190(e) : Route Condition Survey Route 1-D (vi)



Transaction Advisory Services of
Bus Operation Plan For BRT Yellow Line Project
Route Condition Survey

Direction

Mazar-e-Quaid Flyover

Society Office

ID	Location Name
17	Mazar-e-Quaid Flyover
18	PPP sect. Chowrangi
19	Allah Monoment
20	Society Office

No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 2
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: one side
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

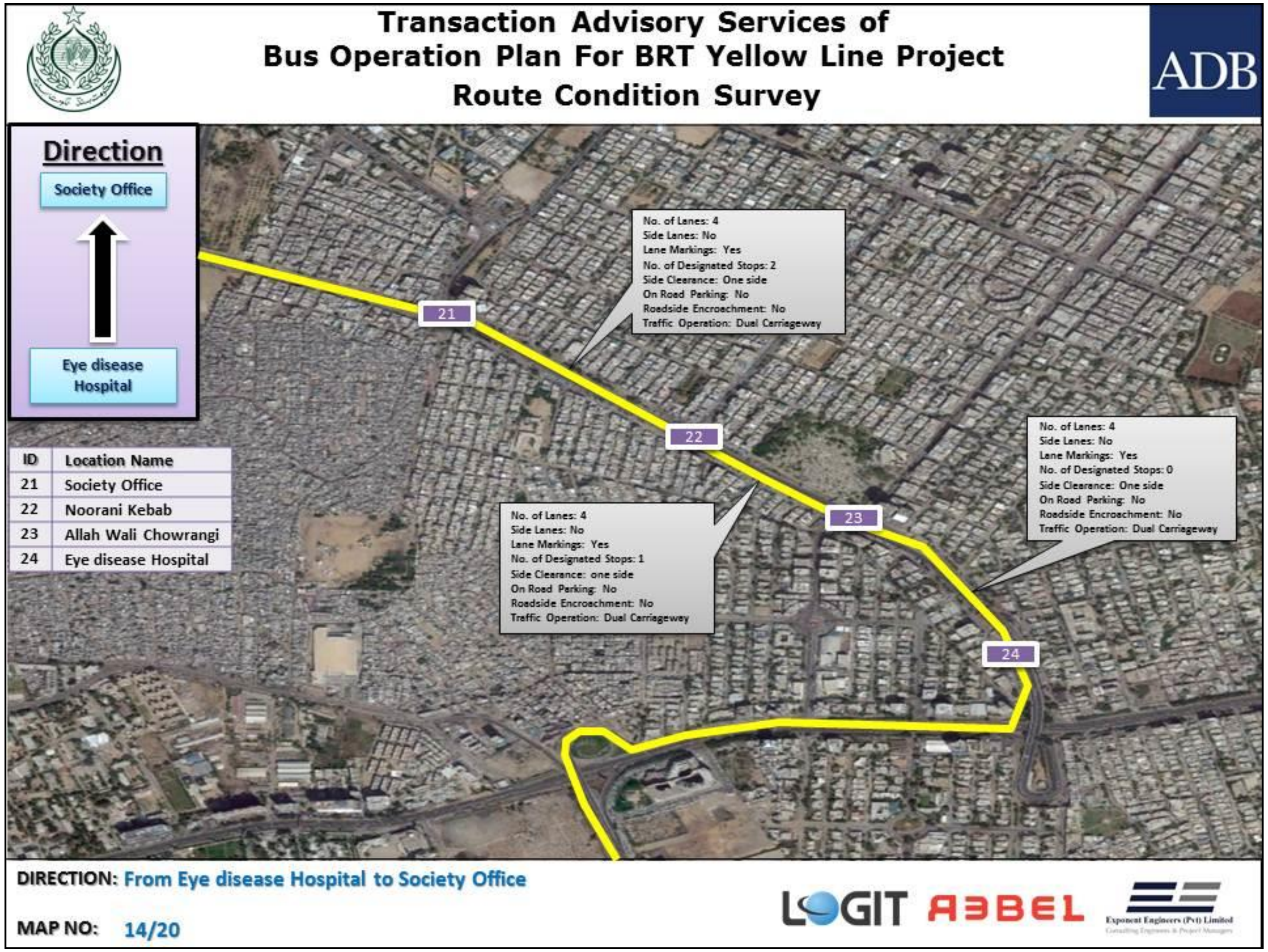
No. of Lanes: 3
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: one side
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

DIRECTION: From Society Office to Mazar-e-Quaid

MAP NO: 13/20

Figure 3.190 (f) : Route Condition Survey Route 1-D (vii)



Transaction Advisory Services of
Bus Operation Plan For BRT Yellow Line Project
Route Condition Survey

Direction

Society Office

Eye disease Hospital

ID	Location Name
21	Society Office
22	Noorani Kebab
23	Allah Wali Chowrangi
24	Eye disease Hospital

No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 2
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

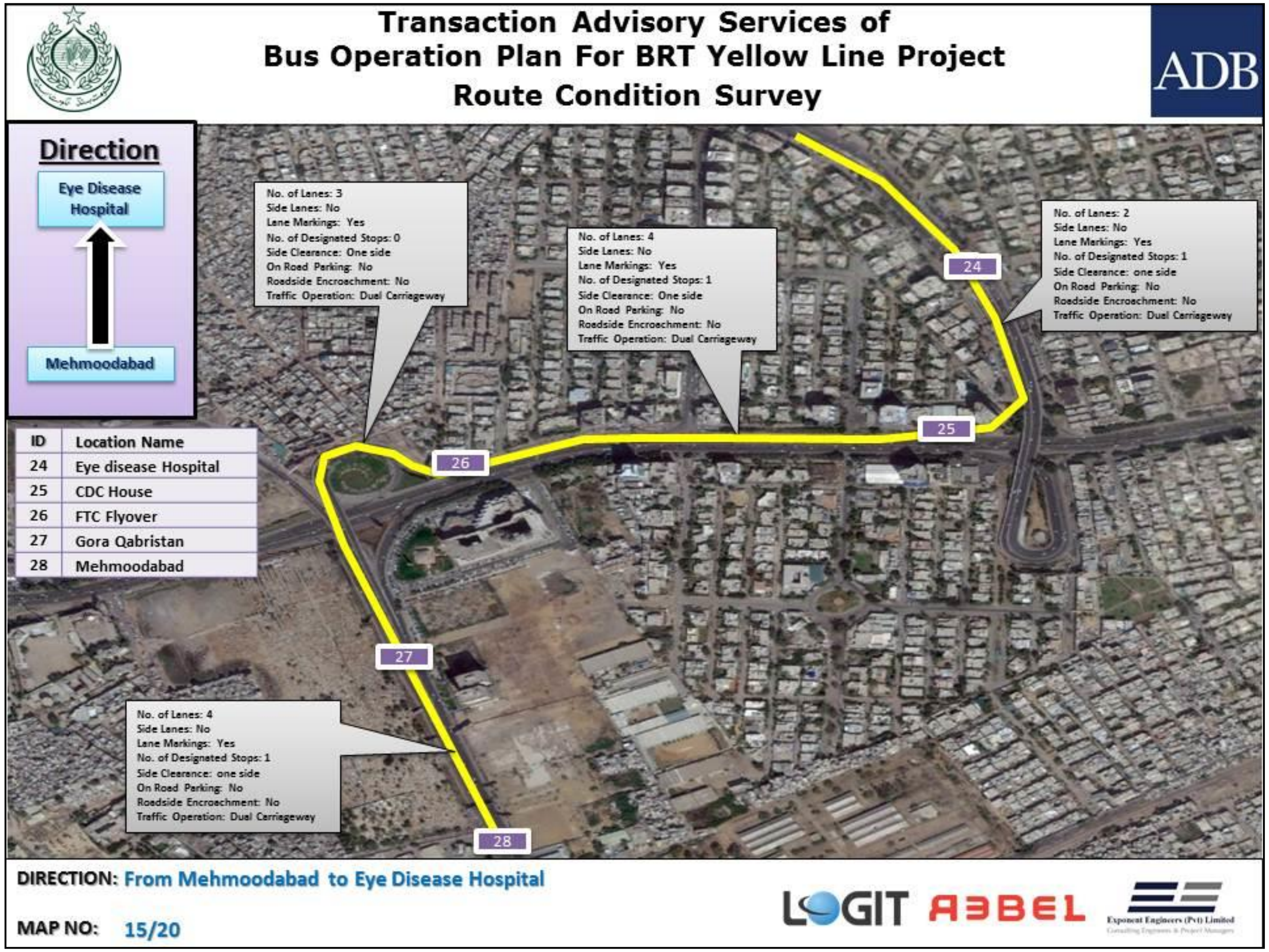
No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 1
Side Clearance: one side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

DIRECTION: From Eye disease Hospital to Society Office

MAP NO: 14/20

Figure 3.190 (g) : Route Condition Survey Route 1-D (vii)


Transaction Advisory Services of
Bus Operation Plan For BRT Yellow Line Project
Route Condition Survey
ADB
Direction
Eye Disease Hospital
Mehmoodabad
No. of Lanes: 3
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway
No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 1
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway
No. of Lanes: 2
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 1
Side Clearance: one side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway
24
25
26
27
28
No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 1
Side Clearance: one side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway
DIRECTION: From Mehmoodabad to Eye Disease Hospital
MAP NO: 15/20
LOGIT
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ID	Location Name
24	Eye disease Hospital
25	CDC House
26	FTC Flyover
27	Gora Qabristan
28	Mehmoodabad

Figure 3.190 (h) : Route Condition Survey Route 1-D (viii)

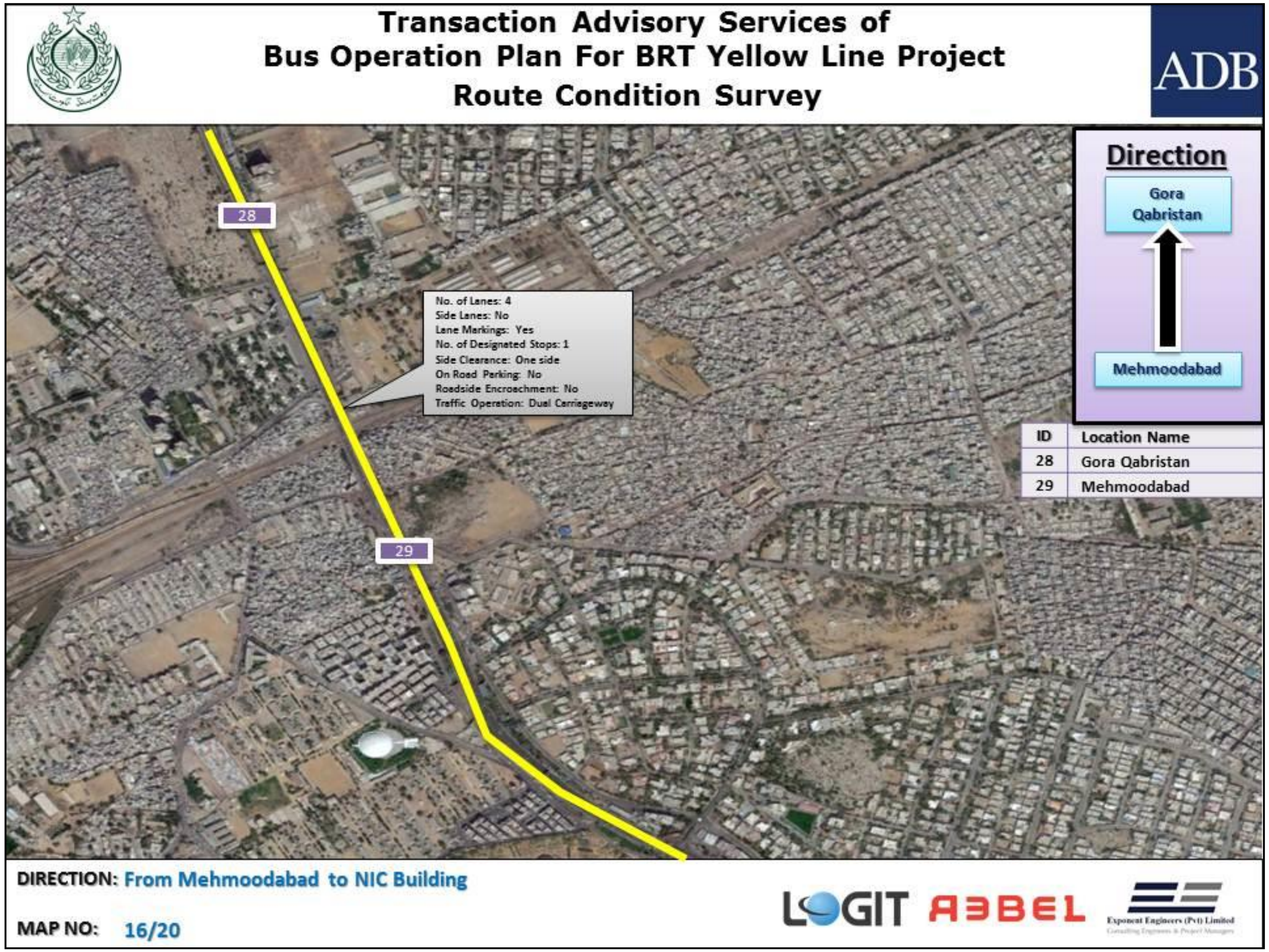
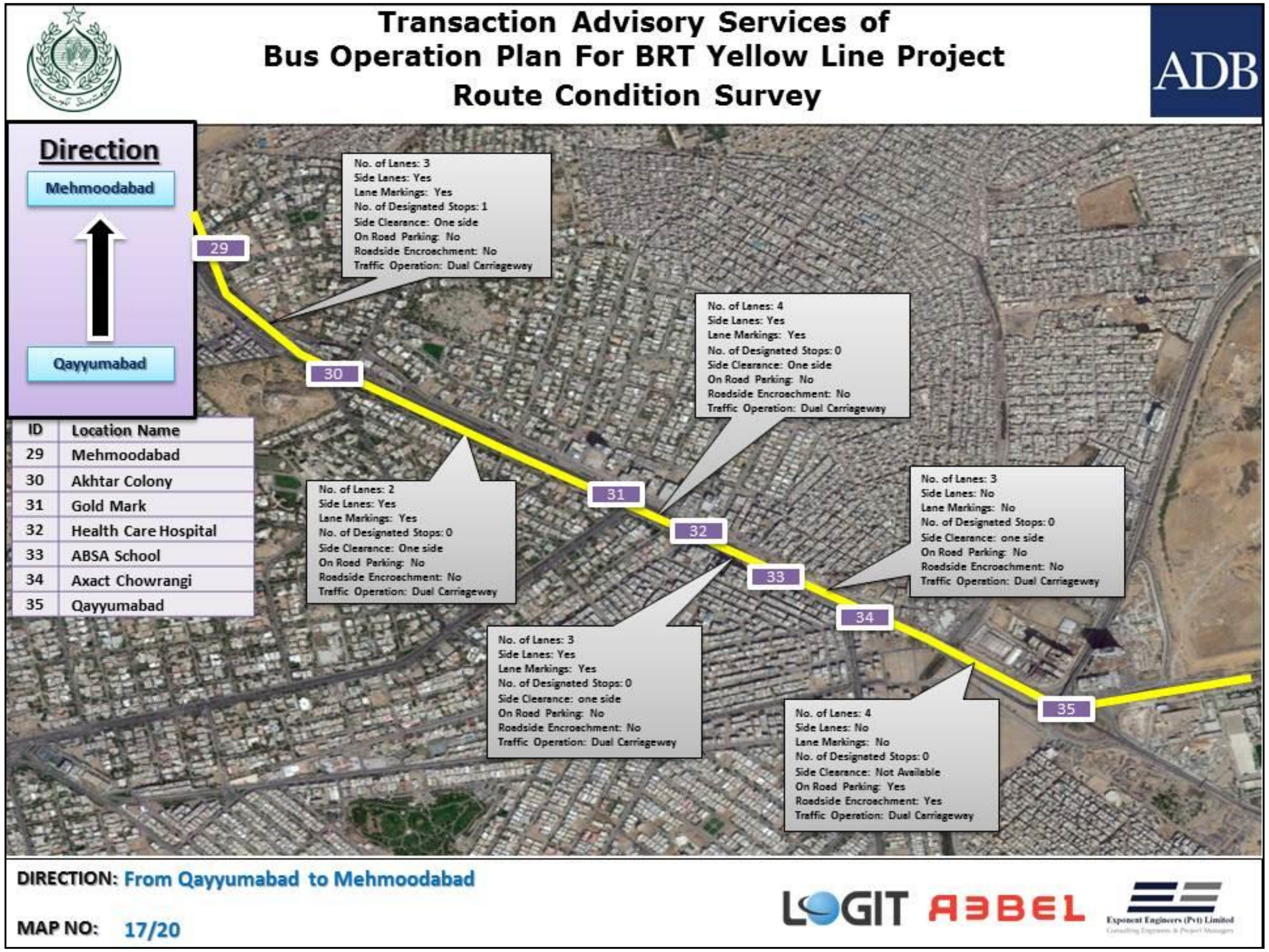

Transaction Advisory Services of
Bus Operation Plan For BRT Yellow Line Project
Route Condition Survey
ADB
28
29
No. of Lanes: 4
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 1
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway
Direction
Gora Qabristan
Mehmoodabad
ID
Location Name
28
Gora Qabristan
29
Mehmoodabad
DIRECTION: From Mehmoodabad to NIC Building
MAP NO: 16/20
LOGIT
A3BEL
Exponent Engineers (Pvt) Limited

Figure 3.190: Route Condition Survey Route 1-E (i)



Transaction Advisory Services of
Bus Operation Plan For BRT Yellow Line Project
Route Condition Survey

ID	Location Name
29	Mehmoodabad
30	Akhtar Colony
31	Gold Mark
32	Health Care Hospital
33	ABSA School
34	Axact Chowrangi
35	Qayyumabad

No. of Lanes: 3
Side Lanes: Yes
Lane Markings: Yes
No. of Designated Stops: 1
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 4
Side Lanes: Yes
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 2
Side Lanes: Yes
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: one side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

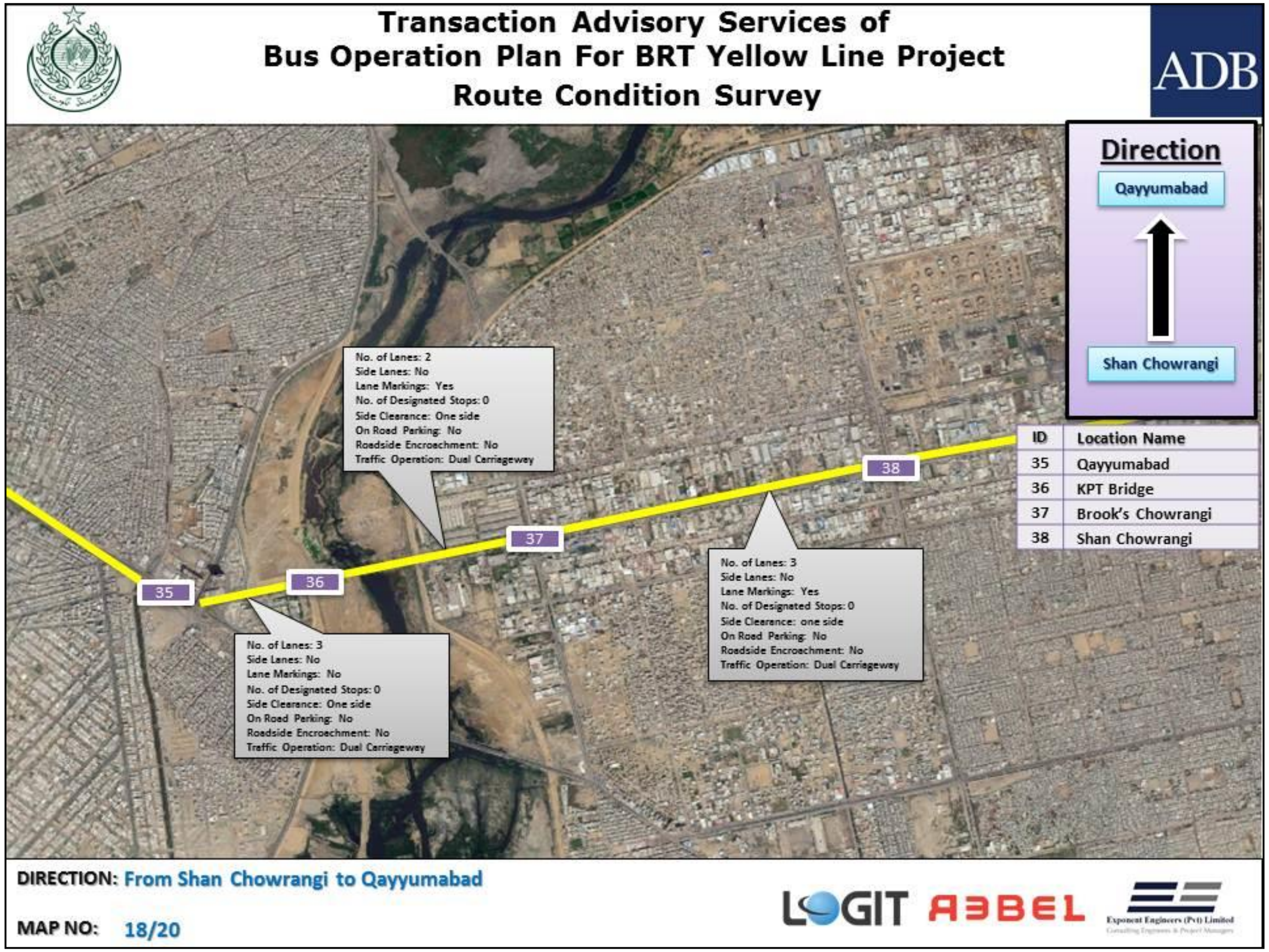
No. of Lanes: 3
Side Lanes: Yes
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: one side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 4
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

DIRECTION: From Qayyumabad to Mehmoodabad

MAP NO: 17/20

Figure 3.190 (a) : Route Condition Survey Route 1-E (ii)



Transaction Advisory Services of
Bus Operation Plan For BRT Yellow Line Project
Route Condition Survey

Direction
Qayyumabad
Shan Chowrangi

ID	Location Name
35	Qayyumabad
36	KPT Bridge
37	Brook's Chowrangi
38	Shan Chowrangi

No. of Lanes: 2
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

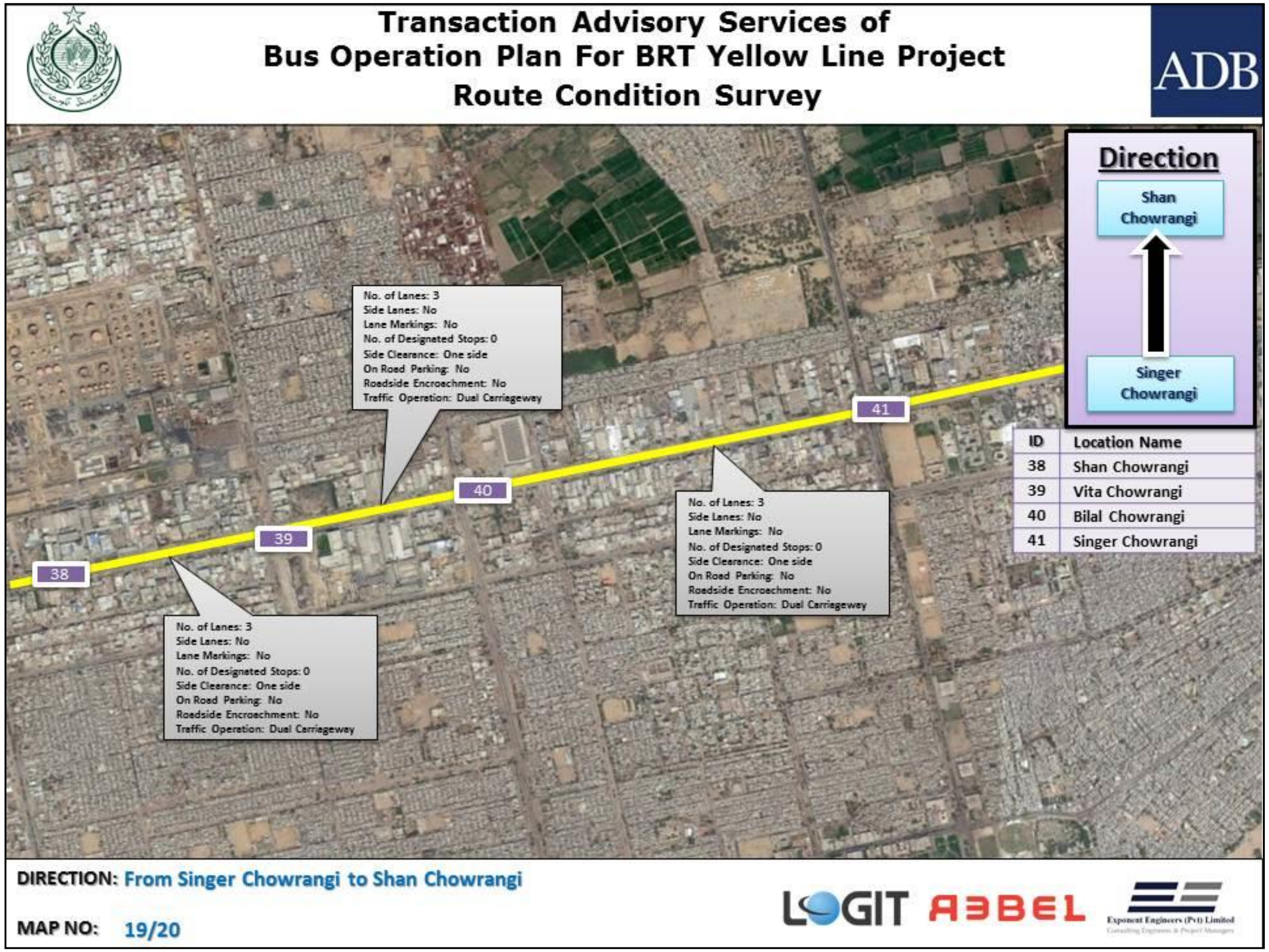
No. of Lanes: 3
Side Lanes: No
Lane Markings: Yes
No. of Designated Stops: 0
Side Clearance: one side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

DIRECTION: From Shan Chowrangi to Qayyumabad

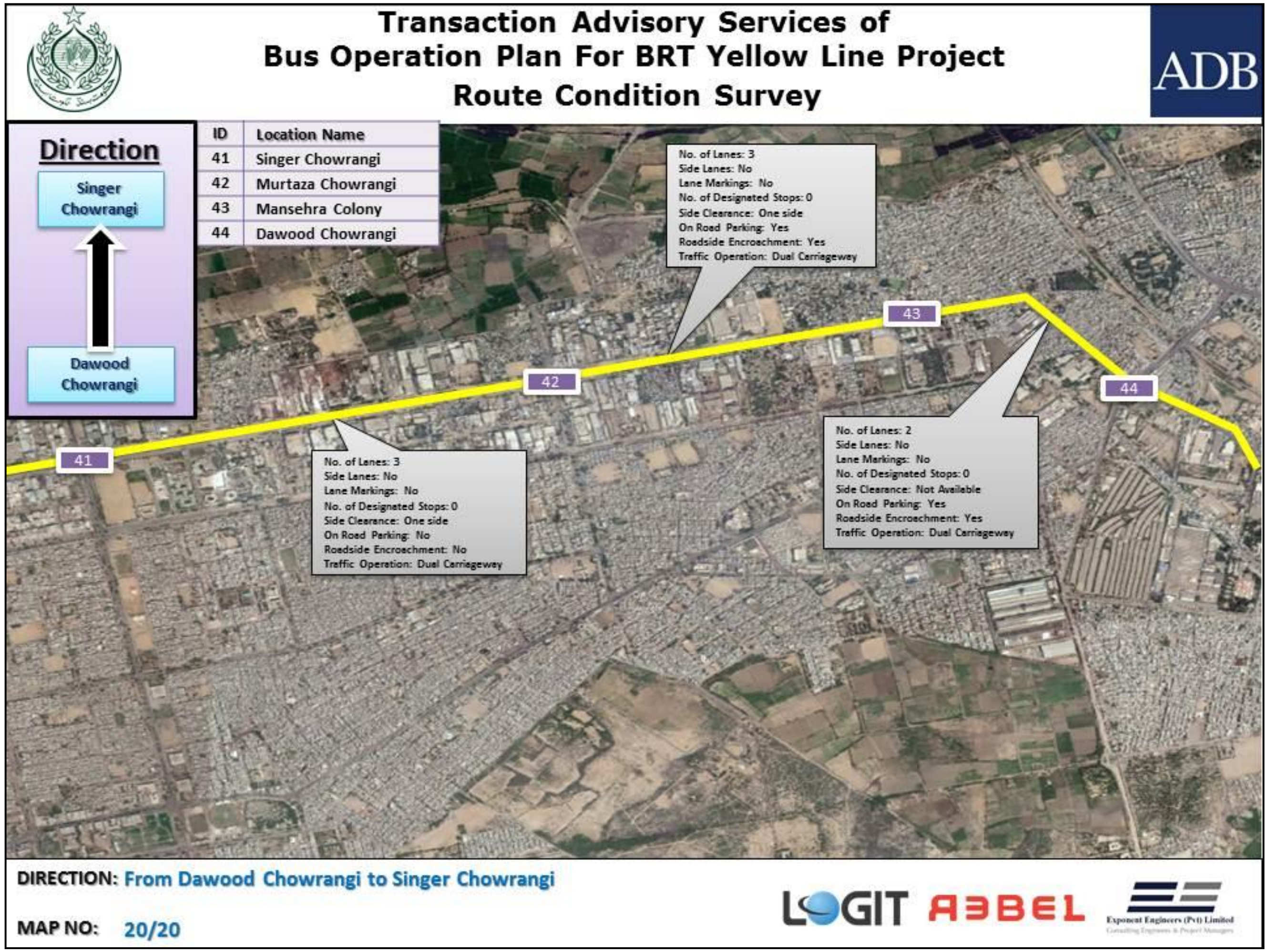
MAP NO: 18/20

Figure 3.190b) : Route Condition Survey Route 1-E (iii)


Transaction Advisory Services of
Bus Operation Plan For BRT Yellow Line Project
Route Condition Survey
ADB
Direction
Shan Chowrangi
Singer Chowrangi
38
39
40
41
No. of Lanes: 3
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway
DIRECTION: From Singer Chowrangi to Shan Chowrangi
MAP NO: 19/20
LOGIT
ABBEL
Exponent Engineers (Pvt) Limited

ID	Location Name
38	Shan Chowrangi
39	Vita Chowrangi
40	Bilal Chowrangi
41	Singer Chowrangi

Figure 3.190 (c) : Route Condition Survey Route 1-E (iv)



Transaction Advisory Services of
Bus Operation Plan For BRT Yellow Line Project
Route Condition Survey

ID	Location Name
41	Singer Chowrangi
42	Murtaza Chowrangi
43	Mansehra Colony
44	Dawood Chowrangi

No. of Lanes: 3
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

No. of Lanes: 3
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: One side
On Road Parking: No
Roadside Encroachment: No
Traffic Operation: Dual Carriageway

No. of Lanes: 2
Side Lanes: No
Lane Markings: No
No. of Designated Stops: 0
Side Clearance: Not Available
On Road Parking: Yes
Roadside Encroachment: Yes
Traffic Operation: Dual Carriageway

DIRECTION: From Dawood Chowrangi to Singer Chowrangi

MAP NO: 20/20

Figure 3.190d) : Route Condition Survey Route 1-E (v)

3.3. Public Transport Route Mapping:

Existing Public Transport Route Mapping is a very important exercise that has been conducted.
Following Public Transport Routes are mapped under this survey for Red and Yellow Line.

- Mini Buses
- Coaches
- Large Buses

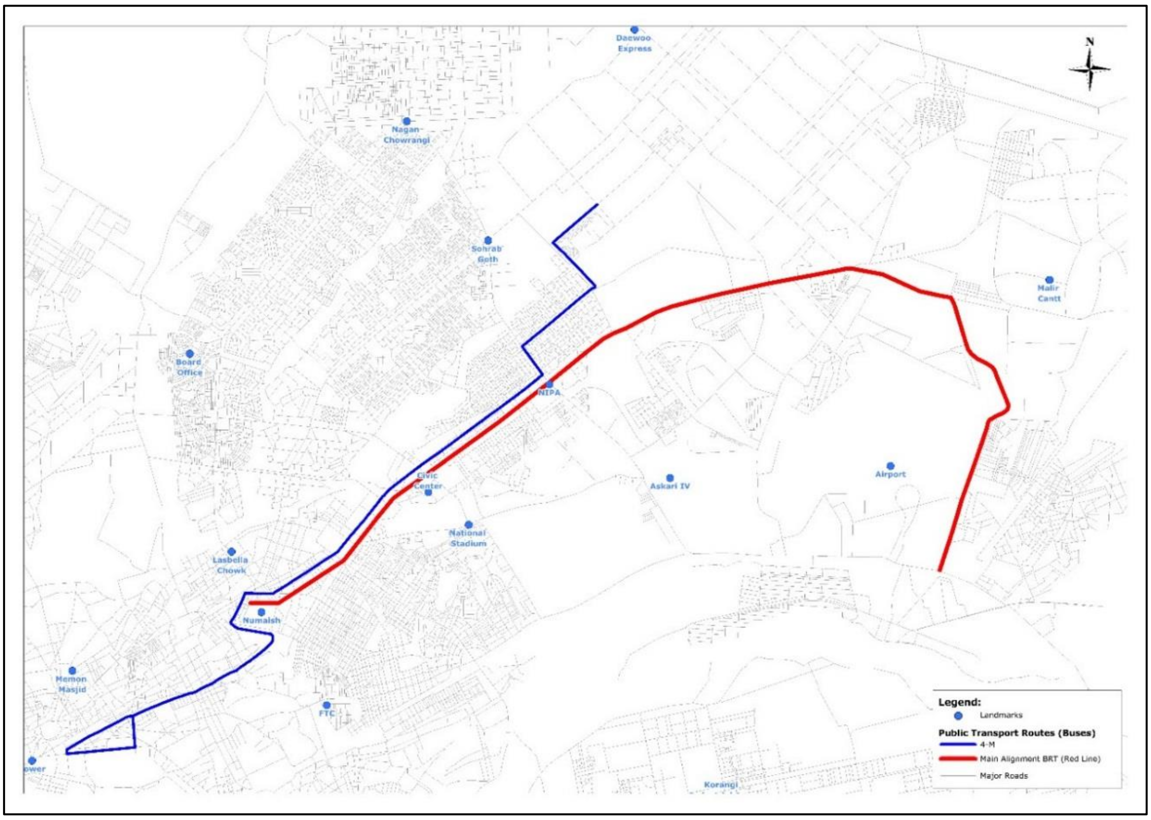


Figure 3.191: Existing Large Bus Route on Red Line BRT

The large bus 4M has a large over lapping percentage with the Red Line. It is entering on the BRT corridor from NIPA and continued till Numaish.

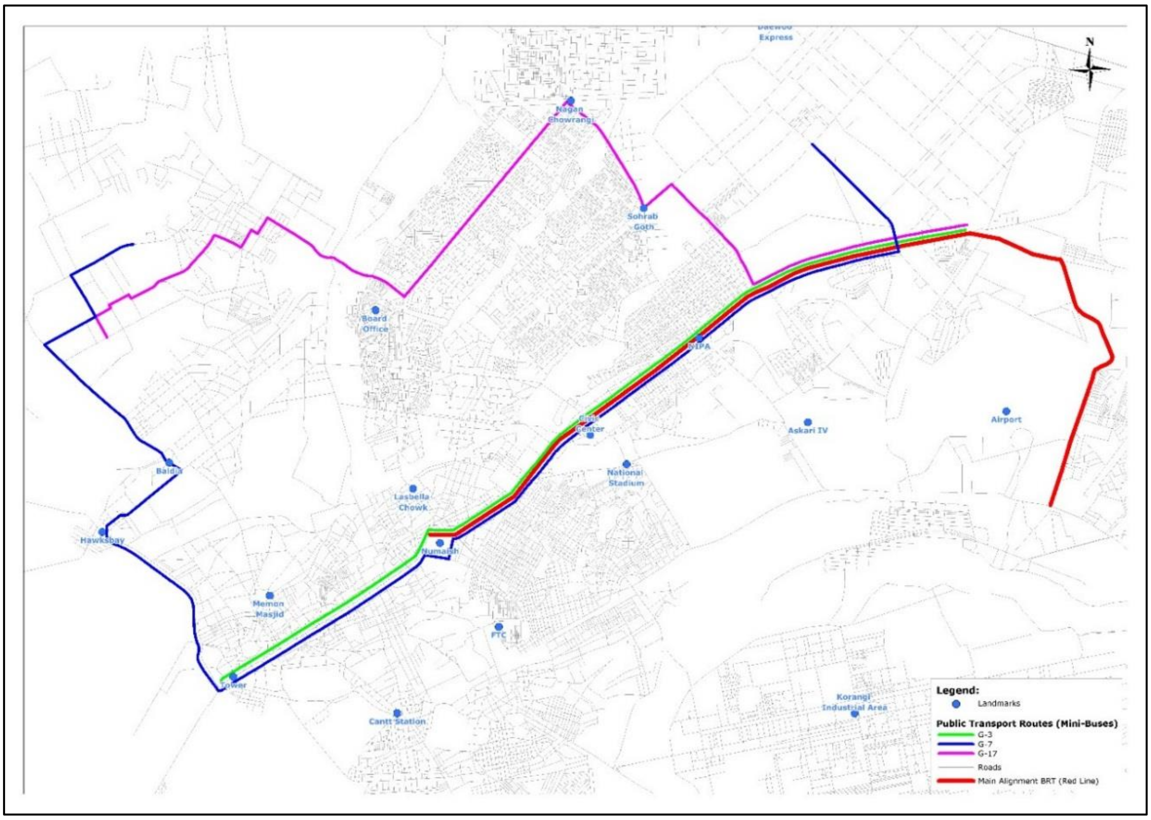


Figure 3.192: Existing Mini Bus Route on Red Line BRT

The Mini Bus covers 3 routes which have significant overlapping on the BRT Main Alignment. Amongst the three, G-3 has 70% overlapping percentage on the Red Line BRT.

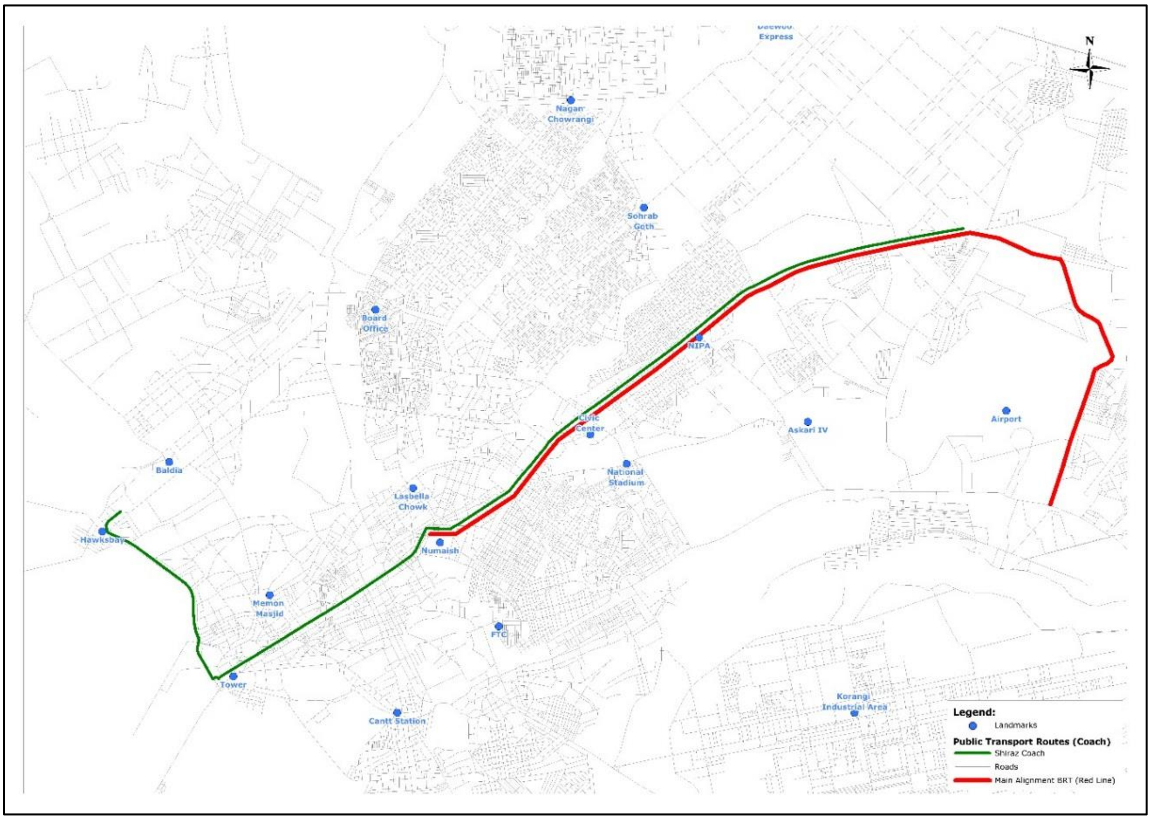


Figure 3.193: Existing Coaches Route on Red Line BRT

Shiraz coach is 70% parallel with the BRT Main Alignment.

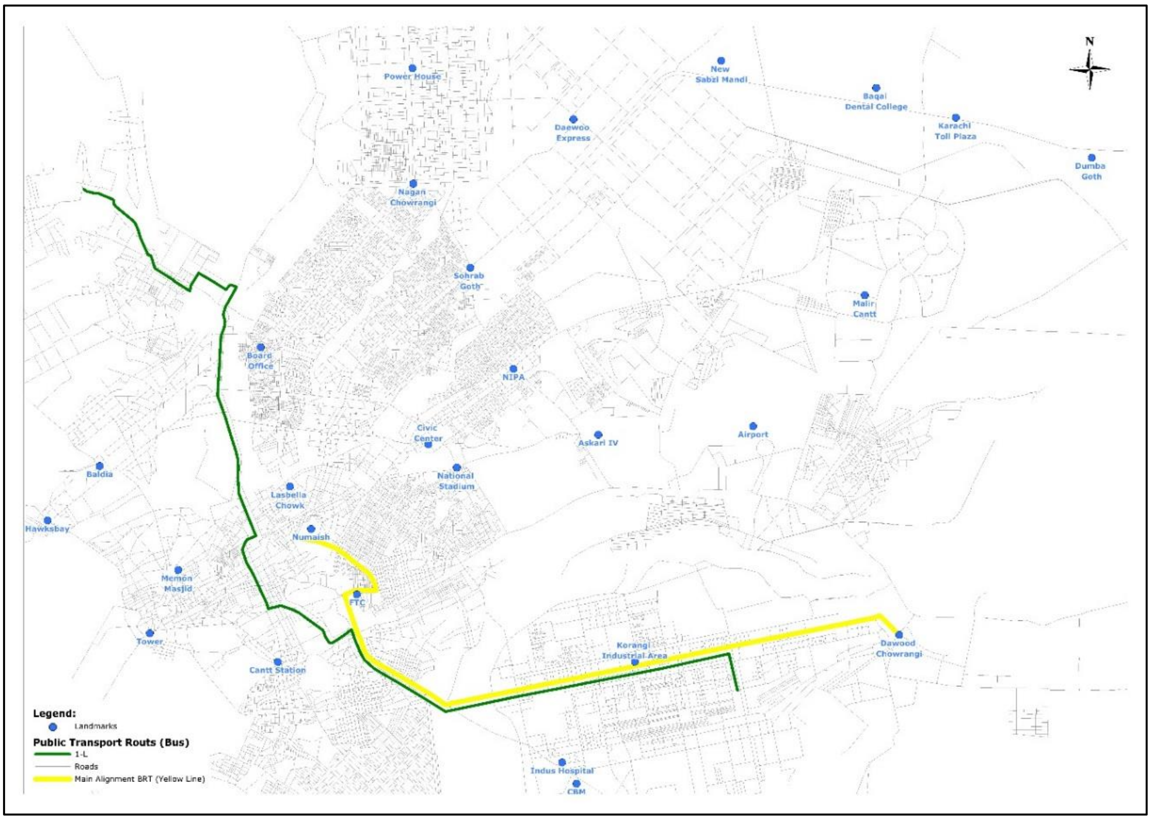


Figure 3.194: Existing Large Bus Route on Yellow Line BRT

1-L covers large overlapping with the BRT Yellow Line Main Alignment.

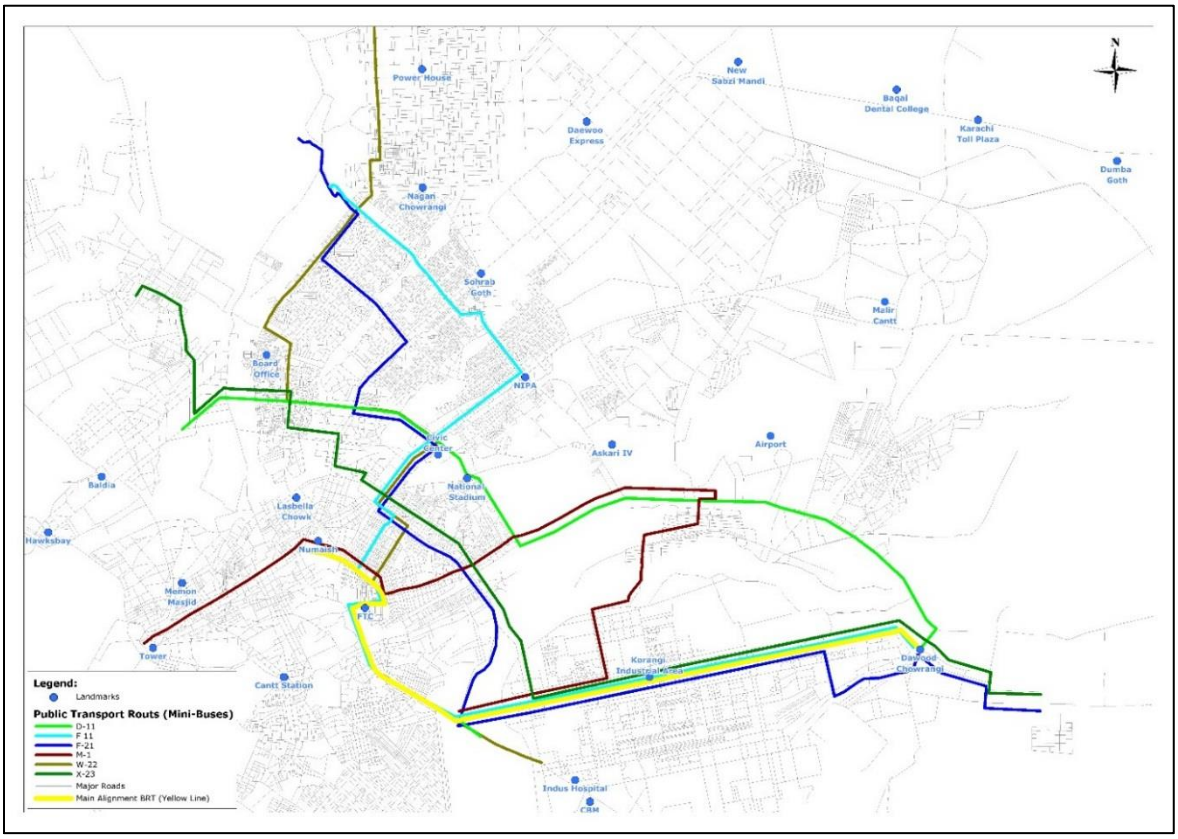


Figure 3.195: Existing Mini Bus Route on Yellow Line BRT

A number of mini buses are running along the BRT Yellow Line. Amongst all of them F-11 has the highest overlapping percentage i.e around 60-70%.

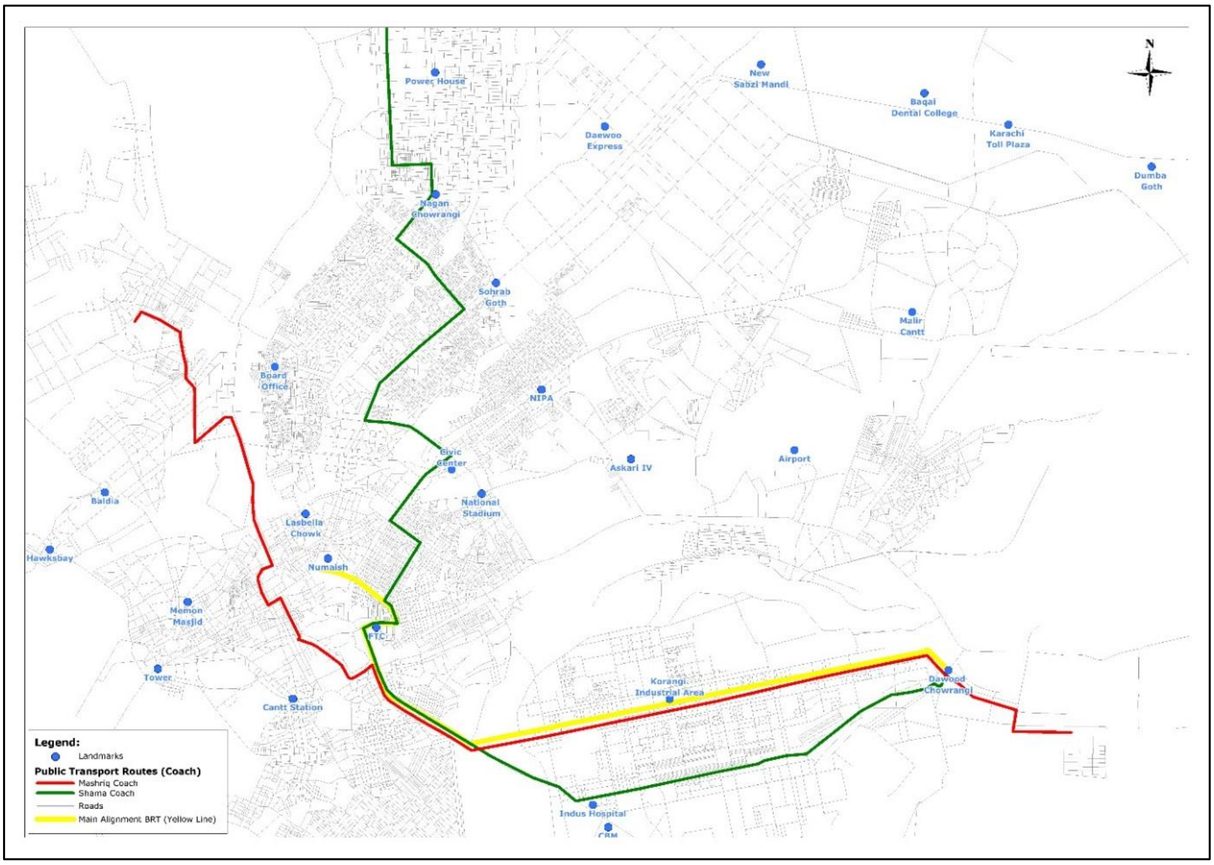


Figure 3.196: Existing Coaches Route on Yellow Line BRT

Mashriq Coach has 80% overlapping on the cBRT yellow line corridor. It is entering the corridor from Kala Pull and continued till Dawood Chowrangi.

3.4. Public Transport Frequency Survey

Existing Public Transport Frequency Survey was conducted at various locations in the city of Karachi to understand the frequency pattern of Public Transport operations. The main objective of conducting this survey is to obtain the existing number of public transport buses operational at these locations for various routes. This data set will be helpful in estimating the demand forecast as a secondary source in collaboration with boarding and alighting data as well as it will be used for rerouting various operational bus routes once the BRTS Corridors will be operational. Data set for following public transport routes were collected during the frequency survey.

- Mini Buses
- Coaches
- Large Buses

Following are the hourly frequency during morning peak hours for each type of public transport mode.

Table 3.4: Hourly summary of the Frequency Table

Location: Dawood University (New M.A Jinnah Road)				Direction: Numaish to Safoora Chorangi			Date: 08/08/2017		
Timings			Shiraz Coach	11-C	P-1	Gulistan Coach	55	S-1	Total
7:00 AM	-	8:00 AM	7	3	1	0	0	0	11
8:00 AM	-	9:00 AM	11	5	0	0	1	0	17
9:00 AM	-	10:00 AM	8	6	4	3	3	0	24
10:00 AM	-	11:00 AM	9	7	7	6	2	0	31
11:00 AM	-	12:00 PM	10	8	8	6	3	0	35
12:00 PM	-	1:00 PM	7	7	7	6	5	0	32
1:00 PM	-	2:00 PM	8	9	4	4	9	0	34
2:00 PM	-	3:00 PM	8	10	8	5	6	0	37
3:00 PM	-	4:00 PM	8	15	7	4	3	0	37
4:00 PM	-	5:00 PM	8	12	14	6	8	2	50
5:00 PM	-	6:00 PM	7	9	8	4	5	1	34
6:00 PM	-	7:00 PM	4	16	12	4	5	2	43
TOTAL			**95**	**107**	**80**	**48**	**50**	**5**	**385**

It can be seen that Shiraz coach has the highest frequency, followed by the Gulistan Coach. There are two coaches, three mini buses and one large bus public routes operating on this location. The total number of buses running along this particular direction, in twelve hours, is coming out to be 385.

Table 3.5: Hourly summary of the Frequency Table

Location: Dawood University (New M.A Jinnah Road)				Direction: Safoora Chorangi to Numaish			Date: 08/08/2017		
Timings			Shiraz Coach	11-C	P-1	Gulistan Coach	55	S-1	Total
7:00 AM	-	8:00 AM	9	0	2	6	0	0	17
8:00 AM	-	9:00 AM	5	2	0	6	3	0	16
9:00 AM	-	10:00 AM	10	3	0	6	4	2	25
10:00 AM	-	11:00 AM	12	6	2	9	4	2	35
11:00 AM	-	12:00 PM	5	1	0	8	0	2	16
12:00 PM	-	1:00 PM	4	5	3	6	4	3	25
1:00 PM	-	2:00 PM	4	5	6	7	4	7	33
2:00 PM	-	3:00 PM	7	7	10	6	9	9	48
3:00 PM	-	4:00 PM	6	3	5	5	8	0	27
4:00 PM	-	5:00 PM	7	9	8	6	7	0	37
5:00 PM	-	6:00 PM	7	14	4	5	0	0	30
6:00 PM	-	7:00 PM	6	9	4	7	0	0	26
TOTAL			**82**	**64**	**44**	**77**	**43**	**25**	**335**

In the opposite direction, the large bus 11-C has highest frequency. S-1 has least frequency in both the directions, which mean it has a very small fleet size. The total number of buses running along this particular direction, in twelve hours, is coming out to be 335.

Table 3.6: Hourly summary of the Frequency Table

Location: Bait-ul-Mukkaram Masjid (University Road)									Direction: Numiash to Safoora Chorangi					Date: 08/08/2017			
Timings			11-C	Safari Coach	G-3	A-3	G-7	G-19	Shiraz Coach	F-11	Super Hassan Zai Coach	G-13	Star Line Coach	S-2	Gulistan Coach	Data Coach	Total
7:00 AM	-	8:00 AM	4	2	8	10	4	5	4	2	4	1	2	0	0	0	46
8:00 AM	-	9:00 AM	51	3	14	15	15	11	8	8	4	8	4	3	1	1	100
9:00 AM	-	10:00 AM	5	7	7	9	11	9	6	12	7	5	5	7	5	3	98
10:00 AM	-	11:00 AM	4	5	13	6	5	8	7	8	5	3	2	4	8	4	82
11:00 AM	-	12:00 PM	4	4	15	17	4	6	7	9	5	3	4	3	8	3	92
12:00 PM	-	1:00 PM	3	5	11	14	6	6	8	10	5	4	1	3	6	1	83
1:00 PM	-	2:00 PM	4	3	8	12	4	5	7	10	5	3	1	3	5	3	73
2:00 PM	-	3:00 PM	4	4	8	10	5	5	7	11	5	4	3	4	6	3	79
3:00 PM	-	4:00 PM	4	2	10	13	6	5	6	8	5	3	2	3	3	1	71
4:00 PM	-	5:00 PM	6	3	11	10	6	3	7	11	5	4	1	3	3	2	75
5:00 PM	-	6:00 PM	4	2	9	13	9	8	2	12	7	4	0	3	3	2	78
6:00 PM	-	7:00 PM	4	1	8	11	7	4	3	6	8	0	0	4	3	3	62
TOTAL			**97**	**41**	**122**	**140**	**82**	**75**	**72**	**107**	**65**	**42**	**25**	**40**	**51**	**26**	**939**

It can be seen that A-3 has the highest frequency. A number of Public Transports are running along this location i.e six coaches, seven mini buses and one large bus. The total number of buses running along this particular direction, in twelve hours, is coming out to be 939.

Table 3.7: Hourly summary of the Frequency Table

Location: Bait-ul-Mukkaram Masjid (University Road)									Direction: Numiash to Safoora Chorangi					Date: 08/08/2017			
Timings			G:7	G:19	G:3	S:2	A:3	F:11	Super Hassan Zai Coach	Safari Coach	Gulistan Coach	Shiraz Coach	G:13	11:C	Data Coach	Star Line Coach	Total
7:00 AM	-	8:00 AM	2	5	5	3	11	9	6	2	6	6	3	1	2	1	62
8:00 AM	-	9:00 AM	4	4	9	9	14	9	7	4	4	11	4	4	3	1	87
9:00 AM	-	10:00 AM	9	5	13	2	16	15	8	4	8	9	6	4	3	2	104
10:00 AM	-	11:00 AM	10	4	13	6	13	12	5	3	6	8	3	5	2	4	94
11:00 AM	-	12:00 PM	11	9	16	9	17	5	3	5	9	5	3	4	2	3	101
12:00 PM	-	1:00 PM	11	5	9	10	12	6	4	5	5	4	4	5	2	3	85
1:00 PM	-	2:00 PM	8	6	13	12	12	5	1	5	6	5	3	5	1	2	84
2:00 PM	-	3:00 PM	8	5	11	12	15	7	3	1	5	4	3	3	2	2	81
3:00 PM	-	4:00 PM	4	6	7	12	11	3	3	6	4	5	2	3	1	1	68
4:00 PM	-	5:00 PM	6	7	10	16	7	3	5	2	6	4	2	6	1	0	75
5:00 PM	-	6:00 PM	5	4	11	9	6	4	3	5	6	5	3	4	1	1	67
6:00 PM	-	7:00 PM	5	4	7	9	9	3	5	4	5	8	2	4	0	0	65
TOTAL			**83**	**64**	**124**	**109**	**143**	**81**	**53**	**46**	**70**	**74**	**38**	**48**	**20**	**20**	**973**

Amongst all the public buses operating along this location, G-7 has the highest frequency. The analysis shows that Data Coach has the smallest fleet size. The total number of buses running along this particular direction, in twelve hours, is coming out to be 973.

Table 3.8: Hourly summary of the Frequency Table

Location: Metro Store (University Road)									Direction: Nipa to Safoora									Date: 8/8/2017			
Timings	**G3**	**G19**	**G27**	**F11**	**Shiraz Coach**	**Masood Coach**	**A3**	**Data Coach**	**G25**	**Super Hasan Zai Coach**	**G11**	**S2**	**G13**	**G7**	**Safari Coach**	**11C**	**Star Line Coach**	**W18**	**Gulistan Coach**	**F18**	**Total**
7:00 AM - 8:00 AM	10	6	5	14	8	6	15	2	2	7	4	3	2	3	2	1	2	0	0	0	92
8:00 AM - 9:00 AM	14	9	7	16	10	4	18	5	5	6	8	3	6	13	3	6	3	0	0	0	136
9:00 AM - 10:00 AM	14	8	5	14	12	7	19	3	5	8	8	5	5	9	6	4	1	2	3	0	138
10:00 AM - 11:00 AM	21	7	7	16	8	5	16	3	5	5	6	4	5	7	5	4	2	2	6	0	134
11:00 AM - 12:00 PM	11	4	7	11	7	2	10	2	4	4	6	4	3	4	4	5	2	3	6	1	100
12:00 PM - 1:00 PM	6	2	3	10	4	2	7	0	1	3	3	0	3	5	4	3	2	3	6	1	68
1:00 PM - 2:00 PM	4	4	1	4	2	1	6	0	2	1	5	2	1	7	2	2	2	0	4	1	51
2:00 PM - 3:00 PM	9	5	3	10	5	4	7	3	1	2	3	3	4	4	4	6	2	0	5	2	82
3:00 PM - 4:00 PM	8	5	3	10	6	4	8	2	2	3	5	2	3	5	2	2	1	2	4	2	79
4:00 PM - 5:00 PM	10	4	6	6	5	4	12	2	4	3	2	1	2	5	3	6	3	2	6	3	89
5:00 PM - 6:00 PM	9	8	3	12	4	4	6	3	3	4	4	2	2	5	4	5	4	3	4	2	91
6:00 PM - 7:00 PM	8	7	4	10	4	2	9	4	3	2	4	4	4	4	4	5	4	3	4	1	90
TOTAL	**124**	**69**	**54**	**133**	**75**	**45**	**133**	**29**	**37**	**48**	**58**	**33**	**40**	**71**	**43**	**49**	**28**	**20**	**48**	**13**	**1150**

This location is on the University Road near NIPA. It can be seen that G-3 has the highest frequency. A total of 1150 Public buses are operating along this direction in 12 hours.

Table 3.9: Hourly summary of the Frequency Table

Location: Metro Store (University Road)									Direction: Safoora to Nipa										Date: 8/8/2017		
Timings	**G13**	**G3**	**G11**	**G7**	**G19**	**G25**	**A3**	**S2**	**F11**	**Shiraz Coach**	**Super Hasan Zai Coach**	**Masood Coach**	**Data Coach**	**Safari Coach**	**G27**	**11-C**	**Star Line Coach**	**Gulistan Coach**	**W18**	**F18**	**Total**
7:00 AM - 8:00 AM	4	8	8	4	8	0	18	3	13	7	8	0	3	2	4	1	1	8	0	0	100
8:00 AM - 9:00 AM	3	10	9	4	11	3	20	4	17	9	7	3	3	4	3	4	1	5	0	0	120
9:00 AM - 10:00 AM	5	12	7	7	9	5	17	4	13	9	8	1	2	3	7	4	3	5	2	0	123
10:00 AM - 11:00 AM	3	15	9	9	3	5	16	4	12	9	5	4	2	4	3	5	2	8	4	0	122
11:00 AM - 12:00 PM	5	11	8	9	4	4	14	4	9	9	8	5	3	3	4	4	2	7	2	2	117
12:00 PM - 1:00 PM	4	12	4	10	6	1	13	4	12	4	5	5	1	2	4	5	4	7	3	3	109
1:00 PM - 2:00 PM	3	11	4	10	6	4	14	2	11	6	5	3	1	3	5	5	2	5	3	2	105
2:00 PM - 3:00 PM	4	10	4	6	4	3	7	3	14	5	5	5	3	4	3	3	4	6	3	3	99
3:00 PM - 4:00 PM	3	9	5	5	4	5	10	10	10	6	3	3	2	4	2	3	0	3	3	2	92
4:00 PM - 5:00 PM	3	5	4	6	4	4	10	5	6	7	2	5	2	4	3	6	3	3	2	4	88
5:00 PM - 6:00 PM	2	4	4	5	4	3	9	4	2	4	2	4	5	3	7	4	2	2	2	2	74
6:00 PM - 7:00 PM	3	6	4	4	4	4	13	5	5	4	2	4	4	2	4	4	1	4	5	2	84
TOTAL	**42**	**113**	**70**	**79**	**67**	**41**	**161**	**52**	**124**	**79**	**60**	**42**	**31**	**38**	**49**	**48**	**25**	**63**	**29**	**20**	**1233**

A-3 has the highest frequency. All and all, there are 847 mini buses, 338 coaches and 48 large buses operating in this particular direction. A total of 1233 Public buses are operating along this direction in 12 hours.

Table 3.10: Hourly summary of the Frequency Table

Location: Karachi University				Direction: Karachi University to Safoora				Date: 08/08/2017		
Timings			G:17	G:7	G:3	SHERAZ	MASOOD	G:13	11:C	Total
7:00 AM	-	8:00 AM	4	3	9	5	6	1	0	28
8:00 AM	-	9:00 AM	6	13	12	10	7	6	3	57
9:00 AM	-	10:00 AM	9	12	14	12	7	6	2	62
10:00 AM	-	11:00 AM	7	13	14	12	7	4	6	63
11:00 AM	-	12:00 PM	10	6	9	9	4	6	1	45
12:00 PM	-	1:00 PM	7	6	13	7	5	5	5	48
1:00 PM	-	2:00 PM	8	5	8	7	4	5	5	42
2:00 PM	-	3:00 PM	5	5	10	9	3	2	7	41
3:00 PM	-	4:00 PM	6	7	9	7	4	5	3	41
4:00 PM	-	5:00 PM	7	6	8	7	4	3	6	41
5:00 PM	-	6:00 PM	5	7	10	7	4	3	7	43
6:00 PM	-	7:00 PM	3	6	6	3	2	3	6	29
TOTAL			**77**	**89**	**122**	**95**	**57**	**49**	**51**	**540**

G-3 has the highest frequency. It has 4 mini buses, 2 coaches and 1 large bus routes running along this location. A total of 540 Public buses are operating along this direction in 12 hours.

Table 3.11: Hourly summary of the Frequency Table

Location: Karachi University				Direction: Safoora to Karachi University				Date: 08/08/2017		
Timings			SHERAZ	G:3	G:13	G:7	G:17	11:C	MASOOD	Total
7:00 AM	-	8:00 AM	5	10	3	4	6	1	0	29
8:00 AM	-	9:00 AM	10	11	5	4	3	6	2	41
9:00 AM	-	10:00 AM	9	14	7	8	9	8	5	60
10:00 AM	-	11:00 AM	12	17	14	9	8	12	7	79
11:00 AM	-	12:00 PM	6	10	7	10	10	9	6	58
12:00 PM	-	1:00 PM	7	9	9	6	7	7	2	47
1:00 PM	-	2:00 PM	4	10	7	11	6	9	5	52
2:00 PM	-	3:00 PM	5	8	7	7	8	8	4	47
3:00 PM	-	4:00 PM	6	9	14	9	11	9	6	64
4:00 PM	-	5:00 PM	8	8	11	10	9	8	8	62
5:00 PM	-	6:00 PM	6	5	6	6	5	3	5	36
6:00 PM	-	7:00 PM	6	5	6	8	5	6	4	40
TOTAL			**84**	**116**	**96**	**92**	**87**	**86**	**54**	**615**

G-3 has highest frequency and Masood Coach has the least frequency in this direction. A total of 615 public buses are running along this direction in 12 hours.

Table 3.12: Hourly summary of the Frequency Table

Location: Society Office (Shahra-e-Quideen)			Direction: Numiash to Nursery		Date: 08/08/2017	
Timings			G:7	MARWAT	M:1	Total
7:00 AM	-	8:00 AM	8	10	3	21
8:00 AM	-	9:00 AM	9	13	10	32
9:00 AM	-	10:00 AM	9	10	9	28
10:00 AM	-	11:00 AM	10	11	10	31
11:00 AM	-	12:00 PM	8	10	8	26
12:00 PM	-	1:00 PM	5	11	8	24
1:00 PM	-	2:00 PM	6	12	7	25
2:00 PM	-	3:00 PM	9	13	6	28
3:00 PM	-	4:00 PM	5	9	7	21
4:00 PM	-	5:00 PM	7	11	6	24
5:00 PM	-	6:00 PM	6	6	8	20
6:00 PM	-	7:00 PM	6	4	8	18
TOTAL			**88**	**120**	**90**	**298**

Two mini buses and one coach public bus route is running along this location. A total of 298 public buses are operating along this direction in 12 hours.

Table 3.13: Hourly summary of the Frequency Table

Location: Society Office (Shahra-e-Quideen)			Direction: From Nursery to Numiash		Date: 08/08/2017	
Timings			MARWAT	G:7	M:1	Total
7:00 AM	-	8:00 AM	9	3	6	18
8:00 AM	-	9:00 AM	12	3	12	27
9:00 AM	-	10:00 AM	21	11	6	38
10:00 AM	-	11:00 AM	22	8	8	38
11:00 AM	-	12:00 PM	17	8	8	33
12:00 PM	-	1:00 PM	15	7	9	31
1:00 PM	-	2:00 PM	8	7	9	24
2:00 PM	-	3:00 PM	11	7	10	28
3:00 PM	-	4:00 PM	9	8	9	26
4:00 PM	-	5:00 PM	10	6	5	21
5:00 PM	-	6:00 PM	8	6	5	19
6:00 PM	-	7:00 PM	9	3	7	19
TOTAL			**151**	**77**	**94**	**322**

Marwat Coach has highest frequency and G-7 has least frequency. A total of 322 public buses are operating along this direction in 12 hours.

Table 3.14: Hourly summary of the Frequency Table

Location: Shahra-e-Faisal Between FTC & Nursery					Direction: Nursery to FTC						Date: 08/08/2017					
Timings			16	F:11	UTS-12	DATA	SAFARI	16:D	SHAMA	9:C	SUPER HASSAN ZAI	W:22	MUSLIM	STAR LINE	GREEN BUS	Total
7:00 AM	-	8:00 AM	9	13	3	2	3	3	5	11	5	4	6	0	0	64
8:00 AM	-	9:00 AM	14	11	4	4	3	4	4	7	9	7	12	1	3	83
9:00 AM	-	10:00 AM	18	15	2	4	4	1	8	10	11	7	14	0	4	98
10:00 AM	-	11:00 AM	18	15	2	1	3	2	3	11	6	10	11	0	4	86
11:00 AM	-	12:00 PM	17	11	4	2	3	4	4	8	6	7	8	3	3	80
12:00 PM	-	1:00 PM	13	12	2	2	3	2	3	8	3	6	6	3	5	68
1:00 PM	-	2:00 PM	15	9	2	2	1	3	4	8	5	6	4	2	3	64
2:00 PM	-	3:00 PM	7	10	1	1	4	2	5	7	6	5	4	1	2	55
3:00 PM	-	4:00 PM	13	12	2	2	4	3	4	6	6	4	5	3	3	67
4:00 PM	-	5:00 PM	13	12	3	2	5	3	4	7	4	6	7	1	5	72
5:00 PM	-	6:00 PM	13	9	2	3	5	1	4	7	5	6	5	4	2	66
6:00 PM	-	7:00 PM	13	9	3	4	3	3	5	6	8	6	5	1	2	68
TOTAL			**163**	**138**	**30**	**29**	**41**	**31**	**53**	**96**	**74**	**74**	**87**	**19**	**36**	**871**

It can be seen that mini bus, name 16 has the highest frequency, followed by the bus F-11. A Metro, Green bus is also running along this location. A total of 871 public buses are operating along this direction in 12 hours.

Table 3.15: Hourly summary of the Frequency Table

Location: Shahra-e-Faisal Between FTC & Nursery							Direction: FTC to Nursery				Date: 08/08/2017					
Timings			9C METRO	SAFARI	MUSLIM	W:22	16	F:11	SUPER HASSAN ZAI	STAR LINE	UTS-12	16:D	DATA	SHAMA	GREEN METRO	Total
7:00 AM	-	8:00 AM	14	3	5	5	8	6	4	4	0	3	1	1	0	54
8:00 AM	-	9:00 AM	11	7	8	6	13	10	4	5	3	4	1	4	3	79
9:00 AM	-	10:00 AM	8	7	0	18	3	7	10	5	12	2	2	7	3	84
10:00 AM	-	11:00 AM	9	6	1	17	3	7	5	5	13	3	3	6	3	81
11:00 AM	-	12:00 PM	9	6	14	7	2	8	5	4	1	2	2	5	4	69
12:00 PM	-	1:00 PM	8	8	14	8	1	11	5	5	0	2	3	6	4	75
1:00 PM	-	2:00 PM	9	3	10	9	0	8	5	2	0	4	1	3	6	60
2:00 PM	-	3:00 PM	8	4	11	9	0	5	6	0	0	2	1	2	3	51
3:00 PM	-	4:00 PM	7	6	11	9	2	9	5	5	0	2	1	2	3	62
4:00 PM	-	5:00 PM	7	5	13	8	0	7	7	2	0	3	1	5	4	62
5:00 PM	-	6:00 PM	11	6	11	9	1	6	7	3	0	0	1	2	4	61
6:00 PM	-	7:00 PM	9	4	12	6	1	7	10	4	0	4	1	3	3	64
TOTAL			**110**	**65**	**110**	**111**	**34**	**91**	**73**	**44**	**29**	**31**	**18**	**46**	**40**	**802**

Amongst all the buses, Data coach has the highest frequency. The analysis shows that Data Coach has the smallest fleet size. A total of 802 public buses are operating along this direction in 12 hours.

Table 3.16: Hourly summary of the Frequency Table

Location: Akhtar Colony (Korangi Road)								Direction: From FTC to KPT Flyover												Date: 8/8/2017					
Timings			ILYAS	MASHRIQ	C1	N5	ABDULLAH	W21	W22	H	N	N4	M1	F11	DATA	SHAMA	NEW AFRIDI	X8	GULISTAN	SL	1L	16	W 30	1D	Total
7:00 AM	-	8:00 AM	7	10	4	7	7	4	6	2	9	3	2	10	2	4	8	5	0	1	1	1	0	0	93
8:00 AM	-	9:00 AM	11	11	5	14	7	8	5	3	11	7	2	12	3	4	20	5	1	4	4	0	1	1	139
9:00 AM	-	10:00 AM	9	12	6	8	8	13	8	3	7	10	2	14	3	6	16	5	0	4	2	0	1	5	142
10:00 AM	-	11:00 AM	6	12	3	7	9	6	8	4	7	8	0	12	2	4	14	4	0	2	4	0	0	3	115
11:00 AM	-	12:00 PM	8	9	5	6	7	8	6	4	4	10	1	11	2	3	11	5	0	4	2	0	0	6	112
12:00 PM	-	1:00 PM	8	8	6	4	6	9	5	4	5	8	1	11	4	4	10	4	0	3	4	1	0	3	108
1:00 PM	-	2:00 PM	6	11	4	6	5	6	4	3	5	6	1	14	3	5	9	2	0	3	2	1	0	4	100
2:00 PM	-	3:00 PM	8	7	5	5	4	10	6	4	6	7	1	12	4	3	11	6	0	5	5	0	0	3	112
3:00 PM	-	4:00 PM	5	7	4	6	6	9	4	3	9	7	0	14	2	5	5	4	0	9	2	0	0	2	103
4:00 PM	-	5:00 PM	4	7	5	5	5	6	5	2	5	10	0	11	2	5	10	2	0	6	2	0	0	2	94
5:00 PM	-	6:00 PM	4	8	3	4	2	4	6	5	3	5	0	9	1	5	8	1	0	6	4	0	0	2	80
6:00 PM	-	7:00 PM	4	6	4	3	4	2	6	2	3	7	0	7	1	4	8	1	0	4	1	0	1	4	72
TOTAL			**80**	**108**	**54**	**75**	**70**	**85**	**69**	**39**	**74**	**88**	**10**	**137**	**29**	**52**	**130**	**44**	**1**	**51**	**33**	**3**	**3**	**35**	**1270**

This location is on the Korangi Road near Akhtar Colony. F-11 has the highest frequency. Amongst all the public buses operating on this route, C-1 is a Wagon, having maximum frequency of six buses per hour. A total of 1270 Public buses are operating along this direction in 12 hours.

Table 3.17: Hourly summary of the Frequency Table

Location: Akhtar Colony (Korangi Road)								Direction: KPT Flyover to FTC											Date: 8/8/2017					
Timings			ILYAS	MASHRIQ	C1	N5	ABDULLAH	W21	W22	H	N	N4	F11	DATA	SHAMA	NEW AFRIDI	Xb	GULISTAN	SL	1L	16	x8	1D	Total
7:00 AM	-	8:00 AM	7	5	3	8	5	5	3	5	11	7	6	1	0	11	2	0	3	1	0	4	0	87
8:00 AM	-	9:00 AM	9	9	6	9	8	8	6	5	11	8	11	2	3	13	0	2	5	4	1	8	10	138
9:00 AM	-	10:00 AM	8	10	7	9	5	9	6	5	9	7	15	3	6	11	0	0	7	4	0	8	2	131
10:00 AM	-	11:00 AM	3	10	6	8	5	5	10	4	10	9	8	3	5	13	0	0	6	4	0	0	4	113
11:00 AM	-	12:00 PM	11	11	4	11	1	9	11	6	10	9	10	4	5	6	2	0	8	8	0	0	5	131
12:00 PM	-	1:00 PM	5	5	5	6	4	3	8	4	5	5	7	1	2	9	0	0	5	2	0	0	3	79
1:00 PM	-	2:00 PM	4	6	4	2	5	4	3	3	5	5	8	1	5	10	0	0	5	2	0	0	2	74
2:00 PM	-	3:00 PM	4	5	4	4	4	2	3	4	5	5	13	1	1	7	0	0	8	2	0	1	4	77
3:00 PM	-	4:00 PM	6	7	6	7	4	4	4	4	6	7	9	1	3	10	3	0	5	1	0	2	2	91
4:00 PM	-	5:00 PM	4	6	4	5	6	2	5	3	7	8	12	1	4	10	4	0	7	2	0	0	1	91
5:00 PM	-	6:00 PM	7	8	6	7	3	6	6	2	5	9	11	2	3	15	0	0	6	1	0	0	3	100
6:00 PM	-	7:00 PM	10	6	4	7	4	2	4	2	3	9	9	2	6	10	0	0	4	1	0	1	3	87
TOTAL			**78**	**88**	**59**	**83**	**54**	**59**	**69**	**47**	**87**	**88**	**119**	**22**	**43**	**125**	**11**	**2**	**69**	**32**	**1**	**24**	**39**	**1199**

New Afridi has the highest frequency. All and all, there are 728 mini buses, 412 coaches and 59 Wagons operating in this particular direction. A total of 1199 Public buses are operating along this direction in 12 hours.

Table 3.18: Hourly summary of the Frequency Table

Location: Korangi Road Between Brooks & Shaan									Direction: Brooks Chorangi to Shan Chorangi						Date: 8/8/2017	
Timings			NEW AFRIDI	D11	MARWAT	MASHRIQ	X23	BILAL	N5	Z2	C1	F21	F18	1L	W30	Total
7:00 AM	-	8:00 AM	13	6	19	6	8	7	5	1	2	1	0	0	0	68
8:00 AM	-	9:00 AM	19	7	26	12	10	11	14	4	6	5	5	3	2	124
9:00 AM	-	10:00 AM	15	7	19	11	10	0	9	1	8	7	3	0	5	95
10:00 AM	-	11:00 AM	52	9	29	7	8	13	8	4	15	3	4	6	3	161
11:00 AM	-	12:00 PM	10	3	13	11	6	6	8	1	7	7	0	0	0	72
12:00 PM	-	1:00 PM	6	7	8	7	6	10	3	0	6	3	0	1	0	57
1:00 PM	-	2:00 PM	12	4	13	7	4	3	8	3	5	2	0	1	1	63
2:00 PM	-	3:00 PM	9	6	15	5	8	8	11	2	7	6	4	1	2	84
3:00 PM	-	4:00 PM	10	7	14	9	7	4	8	1	10	1	5	2	1	79
4:00 PM	-	5:00 PM	9	9	14	4	5	7	9	2	4	4	2	0	0	69
5:00 PM	-	6:00 PM	12	11	22	16	5	11	4	2	6	5	0	0	0	94
6:00 PM	-	7:00 PM	7	9	15	6	4	13	5	2	6	3	5	0	0	75
TOTAL			**174**	**85**	**207**	**101**	**81**	**93**	**92**	**23**	**82**	**47**	**28**	**14**	**14**	**1041**

Marwat Coach has the highest frequency. This direction has 8 mini buses, 4 coaches and 1 Wagon public buses routes running along. A total of 1041 Public buses are operating along this direction in 12 hours.

Table 3.19: Hourly summary of the Frequency Table

Location: Korangi Road Between Brooks & Shaan									Direction: Shan Chorangi to Brooks Chorangi						Date: 8/8/2017		
Timings			MASHRIQ	N5	1L	BILAL	W 30	X 23	MARWAT	NEW AFRIDI	C1	F21	D11	F 18	MASHALLAH	Z 2	Total
7:00 AM	-	8:00 AM	8	9	2	6	1	4	17	11	3	2	6	2	1	0	72
8:00 AM	-	9:00 AM	5	6	1	10	0	9	19	13	3	2	6	5	4	2	85
9:00 AM	-	10:00 AM	14	7	3	4	0	4	14	9	6	2	4	5	2	5	79
10:00 AM	-	11:00 AM	26	11	2	8	0	4	13	8	4	1	5	7	1	4	94
11:00 AM	-	12:00 PM	32	9	3	6	0	3	30	19	5	1	3	5	1	2	119
12:00 PM	-	1:00 PM	6	2	4	4	0	3	6	3	6	0	3	3	0	2	42
1:00 PM	-	2:00 PM	7	6	2	2	0	1	7	4	2	1	1	1	0	1	35
2:00 PM	-	3:00 PM	8	7	2	3	0	0	11	4	4	2	1	3	0	2	47
3:00 PM	-	4:00 PM	10	2	1	2	0	2	14	10	1	2	2	2	0	2	50
4:00 PM	-	5:00 PM	9	9	2	6	0	7	12	8	4	1	6	2	0	2	68
5:00 PM	-	6:00 PM	6	3	1	5	0	7	8	8	3	3	3	0	0	0	47
6:00 PM	-	7:00 PM	7	2	0	6	0	6	8	4	5	2	5	0	0	0	45
TOTAL			**138**	**73**	**23**	**62**	**1**	**50**	**159**	**101**	**46**	**19**	**45**	**35**	**9**	**22**	**783**

This location is on Korangi Road in between Brooks Chowrangi and Shaan Chowrangi. Mashriq coach has highest frequency in this direction also. A total of 783 public buses are running along this direction in 12 hours.

3.5. On Board Origin & Destination Survey

On Board Passenger Origin Destination Survey was conducted to collect Origin and destination information of passengers using existing Public Transport to develop public transport user OD matrix. Questionnaire was developed to ask their origin and destination, trip purpose and reason of mode choice. This survey was carried out in line with the Boarding & Alighting Survey and same specifications was used for it. However, separate enumerators were deployed to carry out this survey.

The following types of vehicles were chosen for the board / alight survey:

- Mini Buses
- Large Buses
- Coaches

Mainly the outcome of this survey is the Origin Destination Matrix which is used in the development of Transport Demand Model which will ultimately help in preparing the overall Operational Model for the BRT project. Compilation of all data collected under this type of survey is presented in Appendix – III of this report.

3.6. Boarding & Alighting Survey

As mentioned in earlier parts of the report ‘On-Board passenger Boarding / Alighting Surveys’ assisted in determining very important operational parameters for the Bus Rapid Transit System (BRTS). These included the following:

- Average Speed
- Round Trip Time [On Route]
- Average Time per Stop
- Total Times for Stops
- Round Trip Time [On Route]
- Average Passenger Ratio to Capacity [Seat Replenishment]

The data gathered during survey was processed and various summaries were produced, these included summarizations at Run, Route and Mode Levels. All these summarizations were performed for the following parameters:

- Total Persons Served
- Maximum Occupancy
- Average Seat to Capacity Ratio
- Maximum Seat to Capacity Ratio
- On Route Time
- Route Length
- Average Speed
- Total Stoppages
- Average Time b/w Stoppages
- Stoppage Reasons Summarization

At first, using boarding / alighting data number of person present in bus at a between stops were calculated. This yielded in estimation of Seat to Capacity Ratio, Average & Maximum Occupancy Levels. Similarly, by considering the start and end time on route time was calculated. Since all existing Public Transport routes were already mapped therefore route lengths of each of the routes were already available using the same average operating speed for each public transport vehicle was also calculated. Since total stoppages were recorded and total journey time was calculated, these two yielded in calculating Average Time between stoppages. Lastly, by performing frequency analysis of all the stoppage reasons a summary was prepared showing frequency distribution of stoppage reasons.

Detailed Survey Data is being attached in Appendix III of this survey report. However, analysis based on the data collected is given below in brief:

3.6.1. Mini Bus Routes:

In all there are about 6 operative Mini Bus routes which are significantly overlapping along Red and Yellow Lines. The following discussion would summarize generalized characteristics of each Mini Bus services on the BRT corridor and is presented in Tables below.

Table 3.20: Characteristics of Existing Mini Bus Service G-3

Karachi Bus Rapid Transit Project
Operational Design & Business Model (ODBM) - Red & Yellow Lines BRTS
Summary of Boarding / Alighting Surveys

Bus ID: G-3		Mode: Mini Bus	
S. No.	**Parameter**	**Morning**	
		Peak Direction	**Off Peak Direction**
A	**Route Performance Parameters (Averages)**		
1	Persons Served (Males + Females)	102	98
2	Maximum Occupancy (Average)	-	-
2a	Male Side	33	30
2b	Female Side	16	16
3	Passenger to Capacity Ratio (Average)	-	-
3a	Male Side	2.60	2.62
3b	Female Side	2.27	1.96
4	On Route Time (Hours)	2:13	1:40
5	Route Length (Km)	34.3	
6	Average Speed (KPH)	15.4	20.6
7	Total Stops	42.0	42.0
8	Average Time b/w Stoppages (min)	3.2	2.4

This route shows an average route length of 34.3 km however the average operating speed witnessed on such bus routes was found to be around 15.4 KPH in peak direction and 20.6 KPH in off peak direction. This means that on an average a bus generally takes around two hours to complete their directional journey between terminals. The bus stops at many places during their journey, this makes these buses to stop approximately after every 10-15 minutes of travel. On an average these buses serve 60-65 persons during their peak hour operations in morning.

Table 3.21: Characteristics of Existing Mini Bus Service G-17

Karachi Bus Rapid Transit Project
Operational Design & Business Model (ODBM) - Red & Yellow Lines BRTS
Summary of Boarding / Alighting Surveys

Bus ID: G-17		Mode: Mini Bus	
S. No.	**Parameter**	**Morning**	
		Peak Direction	**Off Peak Direction**
A	**Route Performance Parameters (Averages)**		
1	Persons Served (Males + Females)	110	96
2	Maximum Occupancy (Average)	-	-
2a	Male Side	26	33
2b	Female Side	12	13
3	Passenger to Capacity Ratio (Average)	-	-
3a	Male Side	2.68	2.60
3b	Female Side	2.69	1.89
4	On Route Time (Hours)	1:57	1:20
5	Route Length (Km)	30.8	
6	Average Speed (KPH)	16.0	26.3
7	Total Stops	33	33
8	Average Time b/w Stoppages (min)	3.5	2.4

This route shows an average route length of 30.8 km however the average operating speed witnessed on such bus routes was found to be around 16 KPH in peak direction and 26 KPH in off peak direction. This means that on an average a bus generally takes around two hours to complete their directional journey between terminals. The bus stops at many places during their journey, this makes these buses to stop approximately after every 10-15 minutes of travel. On an average these buses serve 60-65 persons during their peak hour operations in morning.

Table 3.22: Characteristics of Existing Mini Bus Service A-3

Karachi Bus Rapid Transit Project
Operational Design & Business Model (ODBM) - Red & Yellow Lines BRTS
Summary of Boarding / Alighting Surveys

Bus ID: A-3		Mode: Mini Bus	
S. No.	**Parameter**	**Morning**	
		Peak Direction	**Off Peak Direction**
A	**Route Performance Parameters (Averages)**		
1	Persons Served (Males + Females)	81	70
2	Maximum Occupancy (Average)	-	-
2a	Male Side	39	36
2b	Female Side	11	11
3	Passenger to Capacity Ratio (Average)	-	-
3a	Male Side	2.60	1.69
3b	Female Side	0.87	1.73
4	On Route Time (Hours)	1:57	1:15
5	Route Length (Km)	34	
6	Average Speed (KPH)	17.5	27.6
7	Total Stops	22.0	22.0
8	Average Time b/w Stoppages (min)	5.3	3.4

This route shows an average route length of 34 km however the average operating speed witnessed on such bus routes was found to be around 17.5 KPH in peak direction and 27.6 KPH in off peak direction. This means that on an average a bus generally takes around two hours to complete their directional journey between terminals. The bus stops at many places during their journey, this makes these buses to stop approximately after every 10-15 minutes of travel. On an average these buses serve 60-65 persons during their peak hour operations in morning.

Table 3.23: Characteristics of Existing Mini Bus Service C-1

Karachi Bus Rapid Transit Project
Operational Design & Business Model (ODBM) - Red & Yellow Lines BRTS
Summary of Boarding / Alighting Surveys

Bus ID: C-1		Mode: Mini Bus	
S. No.	**Parameter**	**Morning**	
		Peak Direction	**Off Peak Direction**
A	**Route Performance Parameters (Averages)**		
1	Persons Served (Males + Females)	52	64
2	Maximum Occupancy (Average)	-	-
2a	Male Side	21	20
2b	Female Side	9	11
3	Passenger to Capacity Ratio (Average)	-	-
3a	Male Side	1.41	1.65
3b	Female Side	1.00	1.38
4	On Route Time (Hours)	0:42	0:53
5	Route Length (Km)	17	
6	Average Speed (KPH)	24.4	19.3
7	Total Stops	14.0	14.0
8	Average Time b/w Stoppages (min)	3.0	3.8

This route shows an average route length of 17 km however the average operating speed witnessed on such bus routes was found to be around 24.4 KPH in peak direction and 19.3 KPH in off peak direction. This means that on an average a bus generally takes around one hour to complete their directional journey between terminals. The bus stops at many places during their journey, this makes these buses to stop approximately after every 5-10 minutes of travel. On an average these buses serve 60-65 persons during their peak hour operations in morning.

Table 3.24: Characteristics of Existing Mini Bus Service D-11

Karachi Bus Rapid Transit Project			
Operational Design & Business Model (ODBM) - Red & Yellow Lines BRTS			
Summary of Boarding / Alighting Surveys			
Bus ID: D-11		Mode: Mini Bus	
S. No.	**Parameter**	**Morning**	
		Peak Direction	**Off Peak Direction**
A	**Route Performance Parameters (Averages)**		
1	Persons Served (Males + Females)	90	115
2	Maximum Occupancy (Average)	-	-
2a	Male Side	29	31
2b	Female Side	10	10
3	Passenger to Capacity Ratio (Average)	-	-
3a	Male Side	2.47	3.12
3b	Female Side	1.71	2.27
4	On Route Time (Hours)	2:13	2:45
5	Route Length (Km)	40	
6	Average Speed (KPH)	18.6	14.6
7	Total Stops	36.0	36.0
8	Average Time b/w Stoppages (min)	3.7	4.6

This route shows an average route length of 40 km however the average operating speed witnessed on such bus routes was found to be around 18.6 KPH in peak direction and 14.6 KPH in off peak direction. This means that on an average a bus generally takes around two hours to complete their directional journey between terminals. The bus stops at many places during their journey, this makes these buses to stop approximately after every 10-15 minutes of travel. On an average these buses serve 60-65 persons during their peak hour operations in morning.

Table 3.25 Characteristics of Existing Mini Bus Service X-23

Karachi Bus Rapid Transit Project			
Operational Design & Business Model (ODBM) - Red & Yellow Lines BRTS			
Summary of Boarding / Alighting Surveys			
Bus ID: X-23		Mode: Mini Bus	
S. No.	**Parameter**	**Morning**	
		Peak Direction	**Off Peak Direction**
A	**Route Performance Parameters (Averages)**		
1	Persons Served (Males + Females)	108	108
2	Maximum Occupancy (Average)	-	-
2a	Male Side	29	30
2b	Female Side	10	12
3	Passenger to Capacity Ratio (Average)	-	-
3a	Male Side	2.91	3.21
3b	Female Side	2.11	1.62
4	On Route Time (Hours)	2:23	1:34
5	Route Length (Km)	33	
6	Average Speed (KPH)	14.0	21.0
7	Total Stops	33.0	33.0
8	Average Time b/w Stoppages (min)	4.3	2.9

This route shows an average route length of 33 km however the average operating speed witnessed on such bus routes was found to be around 14 KPH in peak direction and 21 KPH in off peak direction. This means that on an average a bus generally takes around two hours to complete their directional journey between terminals. The bus stops at many places during their journey, this makes these buses to stop approximately after every 10-15 minutes of travel. On an average these buses serve 60-65 persons during their peak hour operations in morning.

3.6.2. Coaches Routes:

In all there are about 6 operative Coach Routes which are significantly overlapping along Red and Yellow Lines. The following discussion would summarize generalized characteristics of each Coach services on the BRT corridor and is presented in Tables below.

Table 3.3: Characteristics of Existing Coach Service Gulistan Coach

Karachi Bus Rapid Transit Project

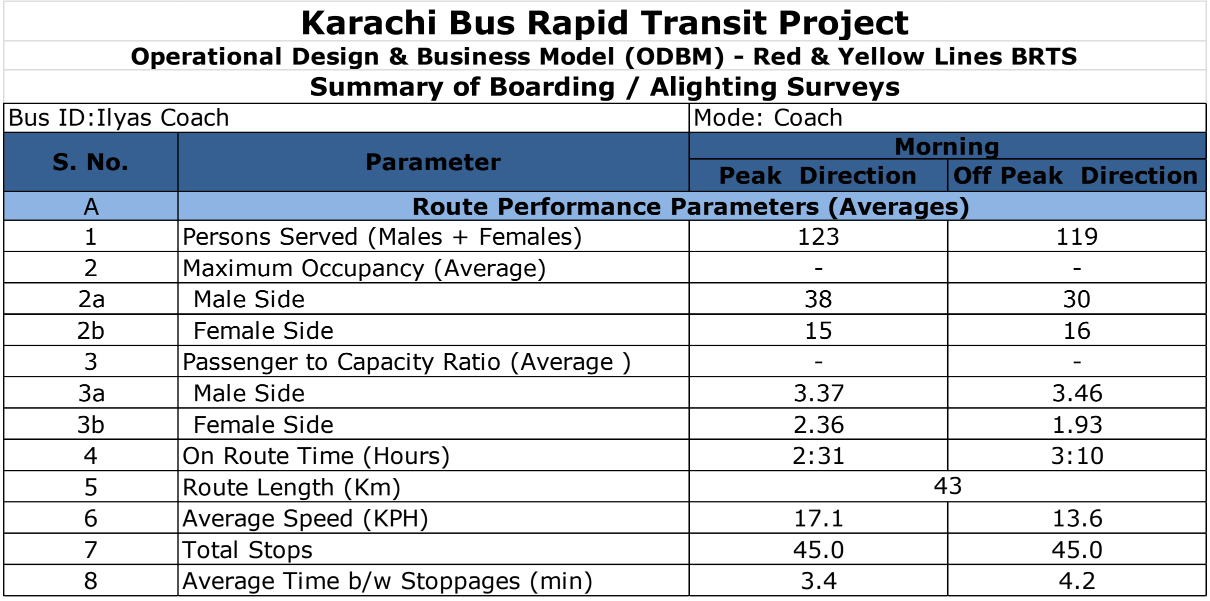
Operational Design & Business Model (ODBM) - Red & Yellow Lines BRTS

Summary of Boarding / Alighting Surveys

Bus ID: Gulistan Coach		Mode: Coach	
S. No.	**Parameter**	**Morning**	
		Peak Direction	**Off Peak Direction**
A	**Route Performance Parameters (Averages)**		
1	Persons Served (Males + Females)	141	98
2	Maximum Occupancy (Average)	-	-
2a	Male Side	33	36
2b	Female Side	14	9
3	Passenger to Capacity Ratio (Average)	-	-
3a	Male Side	3.99	2.91
3b	Female Side	2.44	1.49
4	On Route Time (Hours)	2:50	1:46
5	Route Length (Km)	38.8	
6	Average Speed (KPH)	14.7	22.0
7	Total Stops	41	41
8	Average Time b/w Stoppages (min)	4.2	2.6

This route shows an average route length of 38.8 km however the average operating speed witnessed on such bus routes was found to be around 14.7 KPH in peak direction and 22 KPH in off peak direction. This means that on an average a bus generally takes around two hours to complete their directional journey between terminals. The bus stops at many places during their journey, this makes these buses to stop approximately after every 10-15 minutes of travel. On an average these buses serve 60-65 persons during their peak hour operations in morning.

Table 3.27: Characteristics of Existing Coach Service Ilyas Coach



Karachi Bus Rapid Transit Project

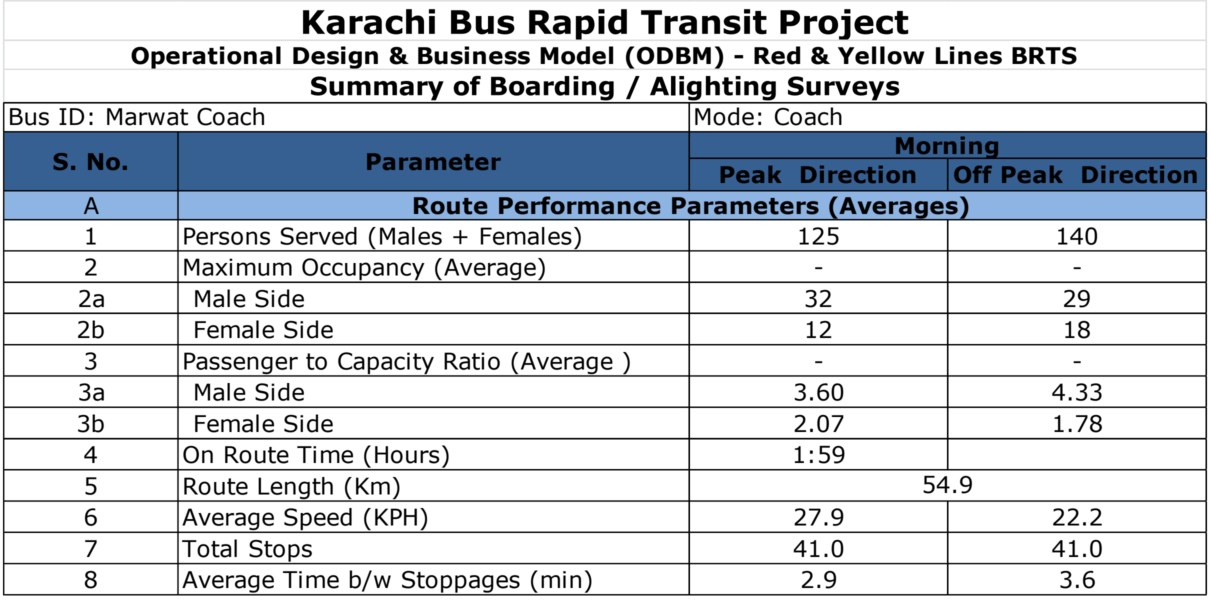
Operational Design & Business Model (ODBM) - Red & Yellow Lines BRTS

Summary of Boarding / Alighting Surveys

Bus ID:Ilyas Coach		Mode: Coach	
S. No.	**Parameter**	**Morning**	
		Peak Direction	**Off Peak Direction**
A	**Route Performance Parameters (Averages)**		
1	Persons Served (Males + Females)	123	119
2	Maximum Occupancy (Average)	-	-
2a	Male Side	38	30
2b	Female Side	15	16
3	Passenger to Capacity Ratio (Average)	-	-
3a	Male Side	3.37	3.46
3b	Female Side	2.36	1.93
4	On Route Time (Hours)	2:31	3:10
5	Route Length (Km)	43	
6	Average Speed (KPH)	17.1	13.6
7	Total Stops	45.0	45.0
8	Average Time b/w Stoppages (min)	3.4	4.2

This route shows an average route length of 38.8 km however the average operating speed witnessed on such bus routes was found to be around 14.7 KPH in peak direction and 22 KPH in off peak direction. This means that on an average a bus generally takes around two hours to complete their directional journey between terminals. The bus stops at many places during their journey, this makes these buses to stop approximately after every 10-15 minutes of travel. On an average these buses serve 60-65 persons during their peak hour operations in morning.

Table 3.28: Characteristics of Existing Coach Service Marwat Coach



Karachi Bus Rapid Transit Project

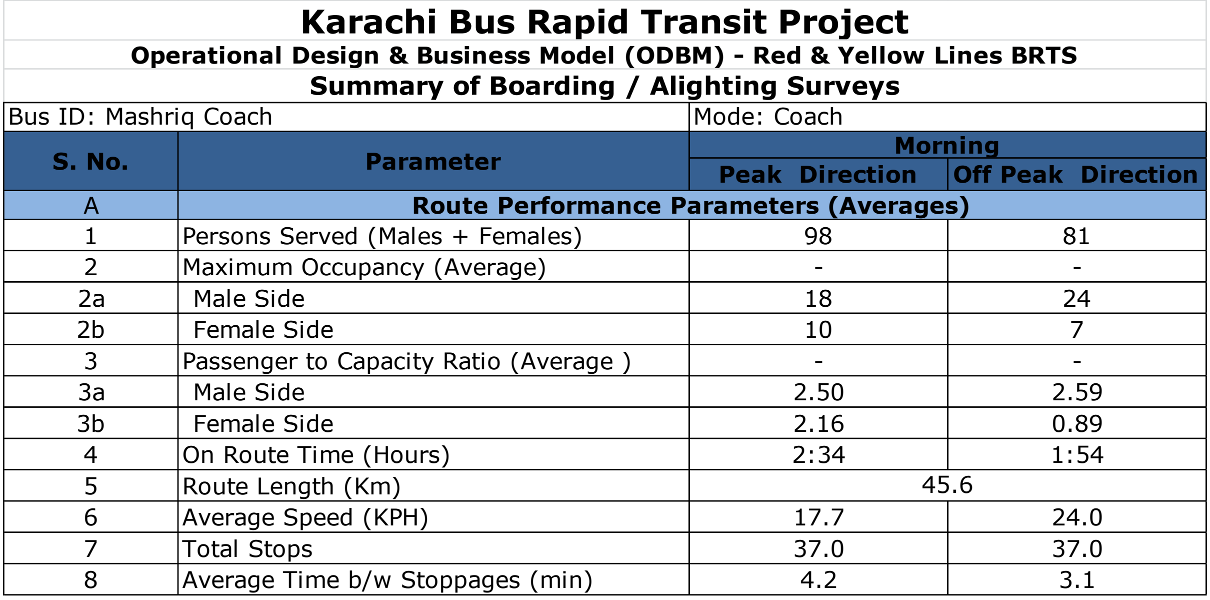
Operational Design & Business Model (ODBM) - Red & Yellow Lines BRTS

Summary of Boarding / Alighting Surveys

Bus ID: Marwat Coach		Mode: Coach	
S. No.	**Parameter**	**Morning**	
		Peak Direction	**Off Peak Direction**
A	**Route Performance Parameters (Averages)**		
1	Persons Served (Males + Females)	125	140
2	Maximum Occupancy (Average)	-	-
2a	Male Side	32	29
2b	Female Side	12	18
3	Passenger to Capacity Ratio (Average)	-	-
3a	Male Side	3.60	4.33
3b	Female Side	2.07	1.78
4	On Route Time (Hours)	1:59	
5	Route Length (Km)	54.9	
6	Average Speed (KPH)	27.9	22.2
7	Total Stops	41.0	41.0
8	Average Time b/w Stoppages (min)	2.9	3.6

This route shows an average route length of 54.9 km however the average operating speed witnessed on such bus routes was found to be around 27.9 KPH in peak direction and 22.2 KPH in off peak direction. This means that on an average a bus generally takes around two hours to complete their directional journey between terminals. The bus stops at many places during their journey, this makes these buses to stop approximately after every 10-15 minutes of travel. On an average these buses serve 60-65 persons during their peak hour operations in morning.

Table 3.29: Characteristics of Existing Coach Service Masriq Coach



Karachi Bus Rapid Transit Project

Operational Design & Business Model (ODBM) - Red & Yellow Lines BRTS

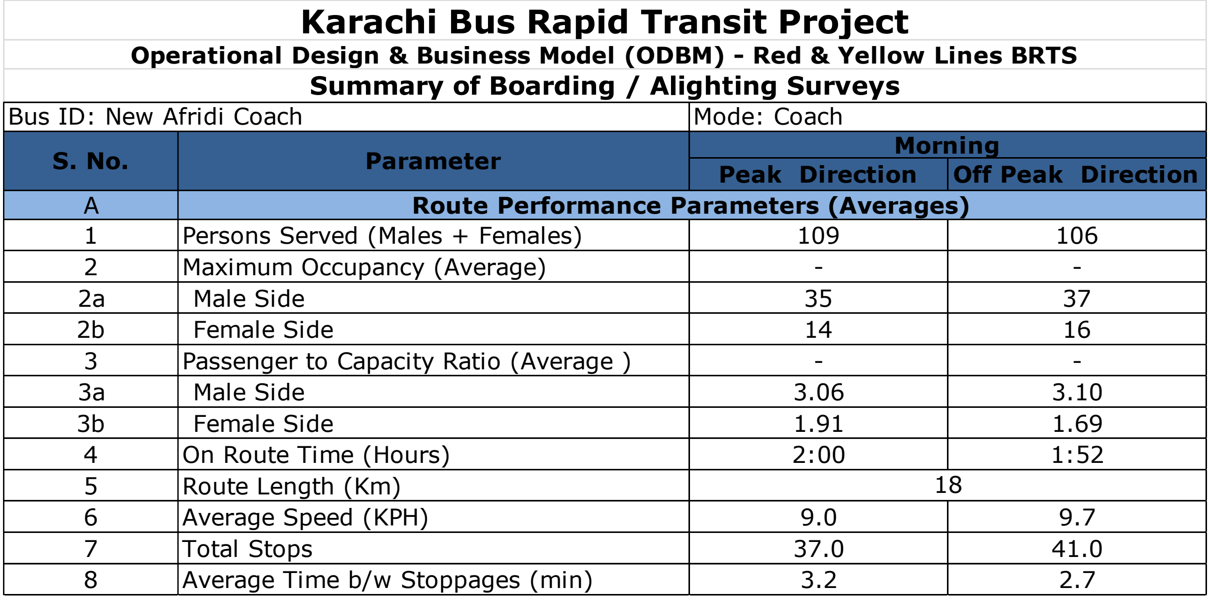
Summary of Boarding / Alighting Surveys

Bus ID: Mashriq Coach | Mode: Coach

S. No.	**Parameter**	**Morning**	
		Peak Direction	**Off Peak Direction**
A	**Route Performance Parameters (Averages)**		
1	Persons Served (Males + Females)	98	81
2	Maximum Occupancy (Average)	-	-
2a	Male Side	18	24
2b	Female Side	10	7
3	Passenger to Capacity Ratio (Average)	-	-
3a	Male Side	2.50	2.59
3b	Female Side	2.16	0.89
4	On Route Time (Hours)	2:34	1:54
5	Route Length (Km)	45.6	
6	Average Speed (KPH)	17.7	24.0
7	Total Stops	37.0	37.0
8	Average Time b/w Stoppages (min)	4.2	3.1

This route shows an average route length of 45.6 km however the average operating speed witnessed on such bus routes was found to be around 17.7 KPH in peak direction and 24 KPH in off peak direction. This means that on an average a bus generally takes around two hours to complete their directional journey between terminals. The bus stops at many places during their journey, this makes these buses to stop approximately after every 10-15 minutes of travel. On an average these buses serve 60-65 persons during their peak hour operations in morning.

Table 3.30: Characteristics of Existing Coach Service New Afridi Coach



Karachi Bus Rapid Transit Project

Operational Design & Business Model (ODBM) - Red & Yellow Lines BRTS

Summary of Boarding / Alighting Surveys

Bus ID: New Afridi Coach | Mode: Coach

S. No.	**Parameter**	**Morning**	
		Peak Direction	**Off Peak Direction**
A	**Route Performance Parameters (Averages)**		
1	Persons Served (Males + Females)	109	106
2	Maximum Occupancy (Average)	-	-
2a	Male Side	35	37
2b	Female Side	14	16
3	Passenger to Capacity Ratio (Average)	-	-
3a	Male Side	3.06	3.10
3b	Female Side	1.91	1.69
4	On Route Time (Hours)	2:00	1:52
5	Route Length (Km)	18	
6	Average Speed (KPH)	9.0	9.7
7	Total Stops	37.0	41.0
8	Average Time b/w Stoppages (min)	3.2	2.7

This route shows an average route length of 18 km however the average operating speed witnessed on such bus routes was found to be around 9 KPH in peak direction and 9.7 KPH in off peak direction. This means that on an average a bus generally takes around two hours to complete their directional journey between terminals. The bus stops at many places during their journey, this makes these buses to stop approximately after every 10-15 minutes of travel. On an average these buses serve 60-65 persons during their peak hour operations in morning.

Table 3.31: Characteristics of Existing Coach Service Shama Hasan Zai Coach

Karachi Bus Rapid Transit Project
Operational Design & Business Model (ODBM) - Red & Yellow Lines BRTS
Summary of Boarding / Alighting Surveys

Bus ID: Shama Hasan Zai Coach		Mode: Coach	
S. No.	**Parameter**	**Morning**	
		Peak Direction	**Off Peak Direction**
A	**Route Performance Parameters (Averages)**		
1	Persons Served (Males + Females)	97	85
2	Maximum Occupancy (Average)	-	-
2a	Male Side	33	35
2b	Female Side	12	14
3	Passenger to Capacity Ratio (Average)	-	-
3a	Male Side	2.72	2.13
3b	Female Side	1.71	1.93
4	On Route Time (Hours)	2:18	2:33
5	Route Length (Km)	47.8	
6	Average Speed (KPH)	20.8	18.8
7	Total Stops	47.7	53.0
8	Average Time b/w Stoppages (min)	3.0	2.9

This route shows an average route length of 47.8 km however the average operating speed witnessed on such bus routes was found to be around 20.8 KPH in peak direction and 18.8 KPH in off peak direction. This means that on an average a bus generally takes around two hours to complete their directional journey between terminals. The bus stops at many places during their journey, this makes these buses to stop approximately after every 10-15 minutes of travel. On an average these buses serve 60-65 persons during their peak hour operations in morning.

Table 3.32: Characteristics of Existing Wagon Service 9-C

Karachi Bus Rapid Transit Project
Operational Design & Business Model (ODBM) - Red & Yellow Lines BRTS
Summary of Boarding / Alighting Surveys

Bus ID: 9-C		Mode: Wagon	
S. No.	**Parameter**	**Morning**	
		Peak Direction	**Off Peak Direction**
A	**Route Performance Parameters (Averages)**		
1	Persons Served (Males + Females)	59	67
2	Maximum Occupancy (Average)	-	-
2a	Male Side	26	25
2b	Female Side	8	13
3	Passenger to Capacity Ratio (Average)	-	-
3a	Male Side	1.79	1.79
3b	Female Side	0.78	1.33
4	On Route Time (Hours)	0:43	1:06
5	Route Length (Km)	15	
6	Average Speed (KPH)	15.0	13.6
7	Total Stops	17.0	18.0
8	Average Time b/w Stoppages (min)	2.5	3.7

This route shows an average route length of 15 km however the average operating speed witnessed on such bus routes was found to be around 15 KPH in peak direction and 13.6 KPH in off peak direction. This means that on an average a bus generally takes around one hour to complete their directional journey between terminals. The bus stops at many places during their journey, this makes these buses to stop approximately after every 10-15 minutes of travel. On an average these buses serve 60-65 persons during their peak hour operations in morning.

3.6.3. Large Bus Routes:

In all there are about 2 operative Large Buses routes which are significantly overlapping along Red and Yellow Lines. The following discussion would summarize generalized characteristics of each Large Bus services on the BRT corridor and is presented in Tables below.

Table 3.33: Characteristics of Existing Large Bus Service 11-C

Karachi Bus Rapid Transit Project			
Operational Design & Business Model (ODBM) - Red & Yellow Lines BRTS			
Summary of Boarding / Alighting Surveys			
Bus ID: 11-C		Mode: Coach	
S. No.	**Parameter**	**Morning**	
		Peak Direction	**Off Peak Direction**
A	**Route Performance Parameters (Averages)**		
1	Persons Served (Males + Females)	80	89
2	Maximum Occupancy (Average)	-	-
2a	Male Side	43	37
2b	Female Side	10	12
3	Passenger to Capacity Ratio (Average)	-	-
3a	Male Side	1.62	1.72
3b	Female Side	1.42	1.80
4	On Route Time (Hours)	1:32	1:43
5	Route Length (Km)	26	
6	Average Speed (KPH)	17.1	15.2
7	Total Stops	33.0	33.0
8	Average Time b/w Stoppages (min)	2.8	3.1

This route shows an average route length of 26 km however the average operating speed witnessed on such bus routes was found to be around 17.1 KPH in peak direction and 15.2 KPH in off peak direction. This means that on an average a bus generally takes around one to one and a half hour to complete their directional journey between terminals. The bus stops at many places during their journey, this makes these buses to stop approximately after every 10-15 minutes of travel. On an average these buses serve 60-65 persons during their peak hour operations in morning.

3.7. Public Transport User Interview Survey (PTUIS):

The Public Transport User Interview Survey (PTUIS) is aimed to gather information regarding trip ODs, occupation, trip frequency, distance that the public transport user travel to arrive at a bus stop, usual fare levels and their average waiting time at the bus stop.

This helped analyze various parameters related to the quality of service, demand between certain OD pairs and the zone of influence that a usual bus stop attracts people from. This may also assist in calculating parameters like target population in the service area, physical size of service area and will also help in validating bus stop locations along the BRTS Corridors.

Moreover, interviews also helped in estimating elasticity of demand with respect to the various service parameters especially with fare. Special emphasis has been given to tap the affordability of existing bus users by asking them about their willingness to pay for the new service. This will certainly help in setting the fare structure for the new service.

A total of 2,400 samples were being collected under this survey category from 13 locations which were almost equally distributed among the locations listed above. It is important to mention here that these 13 locations cover all major Bus Stops along the BRT Corridors.

This data set is then used to develop the Public Transport Origin Destination (OD) Matrix as well which is used in the development Transport Demand Model for the entire network.

Table 3.34 below shows the no. of samples collected from each location for Public Transport User Interview Survey (PTUIS). A total of 3615 samples were being collected under this survey category from 5 locations. The University and Korangi Roads were further break down into segment, and interviews were held at two to three locations, which were almost equally distributed among the segments. It is important to mention here that these 5 locations cover all major Bus Stops along the two BRTS Corridors i.e. Red & Yellow Line BRTS.

Table 3.34: Sample Distribution for Public Transport User Interview Survey on Red Line

S. No.	Location	Sample Size	Percentage Sample
1	Akhtar Colony	242	10.86%
2	Allah Wali Chowrangi	211	9.47%
3	Dawood Chowrangi	336	15.08%
4	Defence Mor	133	5.97%
5	Defence Motors	156	7.00%
6	FTC	247	11.09%
7	Noorani Kabab	196	8.80%
8	Numaish	372	16.70%
9	Shan Chowrangi	281	12.61%
10	Soorti Denim	54	2.42%
Total		**2228**	**100%**

Table 3.35: Sample Distribution for Public Transport User Interview Survey Yellow Line

S. No.	Location	Sample Size	Percentage Sample
1	Hasan square	516	33.08%
2	Jail Chowrangi	167	10.71%
3	NIPA	310	19.87%
4	Safoora Chowrangi	236	15.13%
5	Karachi University	208	13.33%
6	NED Univerisitry	123	7.88%
Total		**1560**	**100%**

3.8. Stated Preference or Willingness to Pay Survey:

Stated Preference or Willingness to Pay Survey was carried out in line with the Public Transport User Interview Surveys. This survey helped in estimating elasticity of demand with respect to the various service parameters especially with fare. Special emphasis was given to tap the affordability of existing bus users by asking them about their willingness to pay for the new service. These certainly help in setting the fare structure for the new service.

As mentioned earlier that one of the major outcome of this interview survey is to attain the commuters 'Willingness to Pay' aspect as this survey is also known as 'Willingness to Pay Survey'. It is basically a function of their weightage that they give to any new service by comparing various improved factors such as time saving, better ridership quality etc. Assessing willingness to pay is in fact trying to figure out the elasticity of transport demand.

As discussed earlier this survey is being carried out for both Public Transport and small Private Vehicle users. Passengers from all Public Transport modes are being interviewed on a sample basis and in case of private vehicles small cars and motor cycle users were being interviewed. In general, this survey will be used in preparing the financial model for the project as well as it will help in setting up a competitive fare for the system at which maximum ridership can be attained.

Table 3.34 below shows the no. of samples collected from each location on Red and Yellow Line. A total of 467 samples were being collected from Red Line and 574 from Yellow Line. It is important to mention here that these locations cover all major Bus Stops along the two BRTS Corridors i.e. Red & Yellow Line BRTS

Table 3.36: Sample Distribution for WTPS (Public Transport) on Red Line

S. No.	Location	Sample Size	Percentage Sample
1	Safoora Chowrangi	94	20.13%
2	Karachi University	86	18.42%
3	NIPA	78	16.70%
4	Civic Centre	91	19.49%
5	Jail Chowrangi	73	15.63%
6	Numaish	45	9.64%
Total		**467**	**100%**

Table 3.37: Sample Distribution for WTPS (Public Transport) on Yellow Line

S. No.	Location	Sample Size	Percentage Sample
1	Dawood Chowrangi	90	19.27%
2	Shan Chowrangi	89	19.06%
3	Akhter Colony	89	19.06%
4	DHA Mor	93	19.91%
5	FTC	100	21.41%
6	Numaish	113	24.20%
Total		**574**	**100%**

Detailed compilation of the data set of this survey is attached in Appendix – III of this report.

3.9. Existing Traffic Signal Timings Survey

There are no signals on Red Line Corridor. For Yellow Line, there are eight junctions which lies On Corridor. Existing Signal timings were collected for all signalized junctions that lie On Corridor. These timings are used for proposing improvements in operations of junctions for the entire corridors in general and for the implementation of signal optimization in particular.

Figures below the junction timings for each of the signalized junctions, collected from the field.

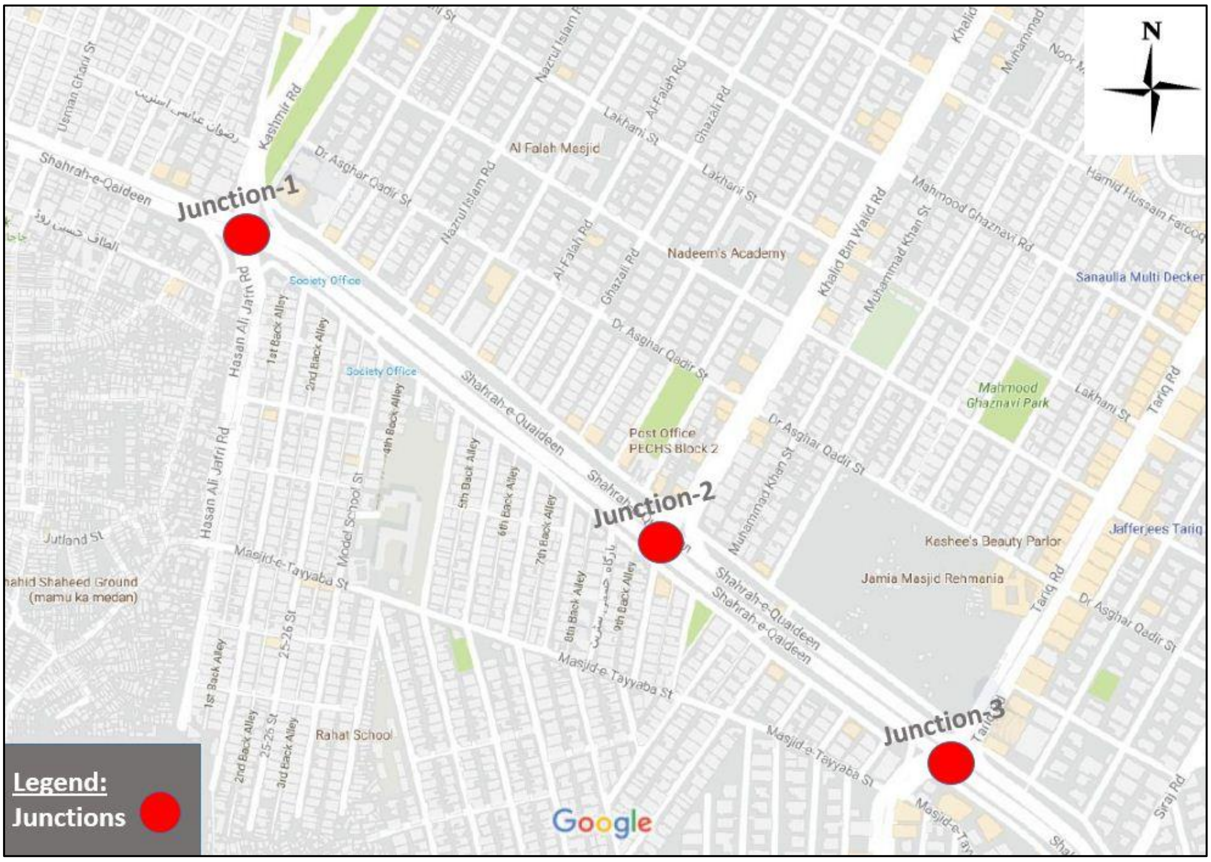


Figure 3.197 (a): Junctions on Yellow Line

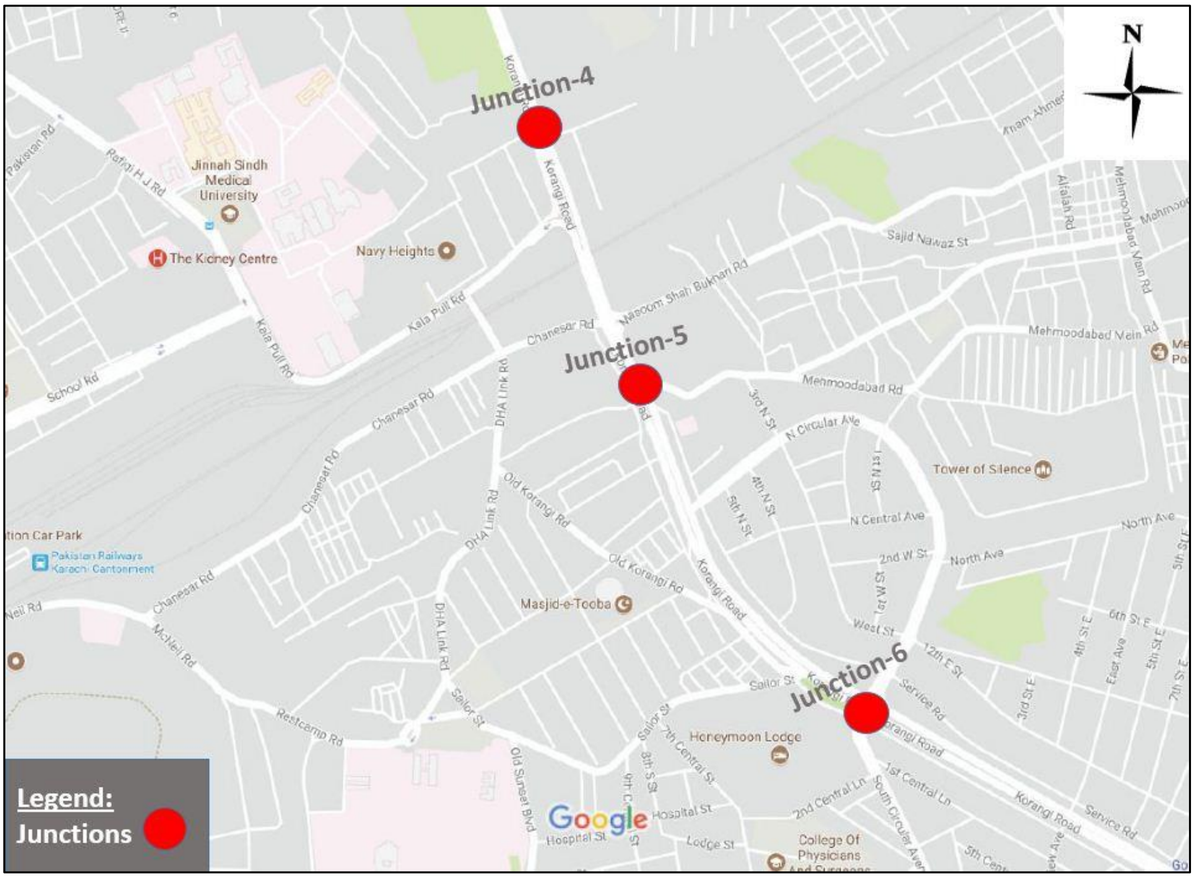


Figure 3.197 (b): Junctions on Yellow Line

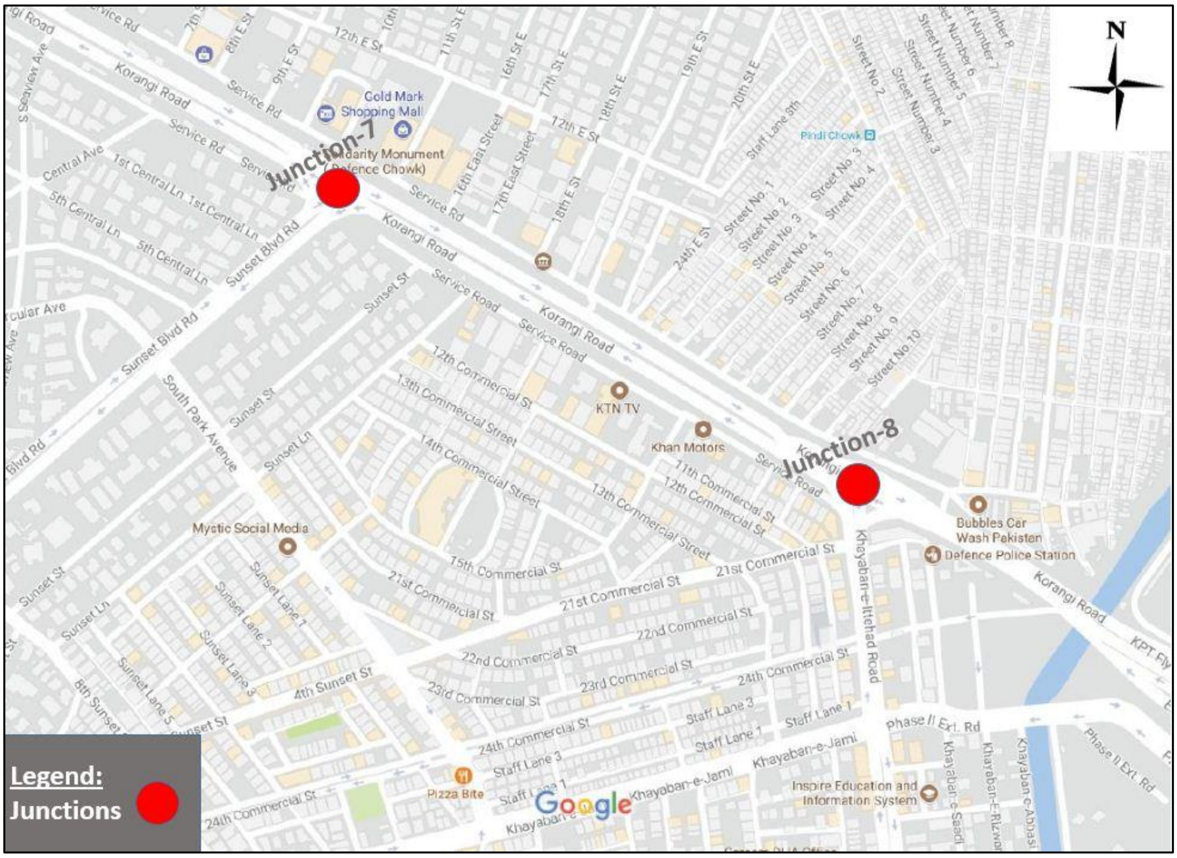
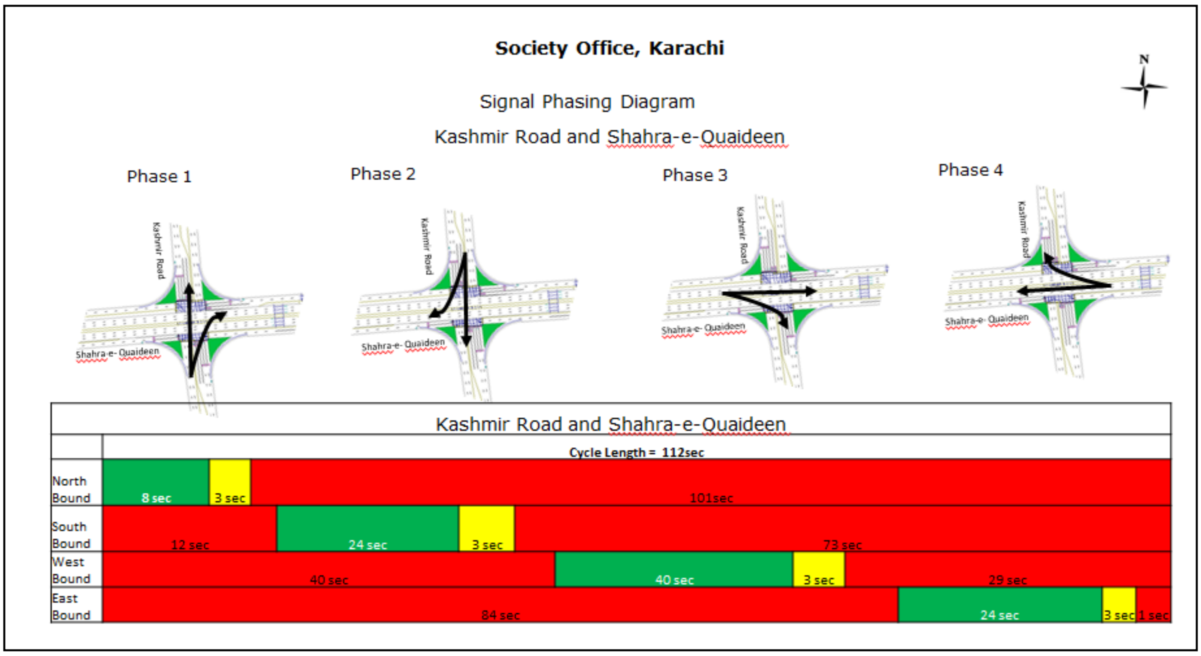


Figure 3.197 (c): Junctions on Yellow Line

The analysis for junctions are discussed below:



Kashmir Road and Shahra-e-Quaideen

	Cycle Length = 112sec				
North Bound	8 sec	3 sec	101sec		
South Bound	12 sec	24 sec	3 sec	73 sec	
West Bound	40 sec	40 sec	3 sec	29 sec	
East Bound	84 sec	24 sec	3 sec	1 sec	

Figure 3.198: Signal Timings at Junction between Kashmir Road and Shahra-e-Quaideen

Junction between Kashmir Road and Shahra-e-Quaideen is a 4 legged signalized junction. Since Shahra-e-Quaideen is one of the most important roads for the city of Karachi hence major flow at this junction is in West & East of Shahra-e-Quaideen. This is the reason why maximum green time is given to this movement which is 40 secs and 24 secs respectively. Whereas traffic moving in North direction has minor green time of 8 sec and traffic turning right and going staright from Shahrae Quaideen have 24 sec green time.

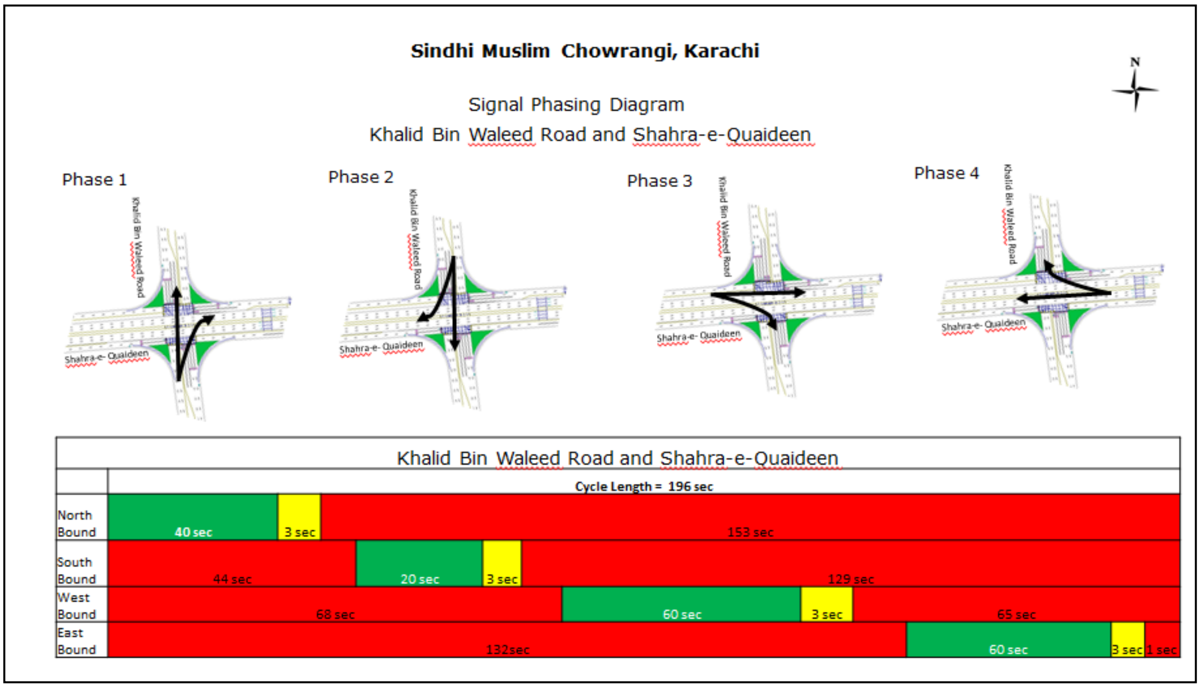


Figure 3.199: Signal Timings at Junction between Khalid Bin Waleed Road and Shahra-e-Quaideen

This junction between Khalid Bin Waleed Road and Shahra-e-Quaideen is another 4 legged signalized junctions. The major flow is from West and East because of Shahra-e-Quaideen being one of the main important roads of the city and hence the green time given is 60 sec. Whereas, the one movement is the minor with green time of 20 secs from Khalid Bin Waleed Road towards Masjid –e- Tayyaba street and 40 secs for traffic coming from Masjid –e- Tayyaba street towards Khalid Bin Waleed Road.

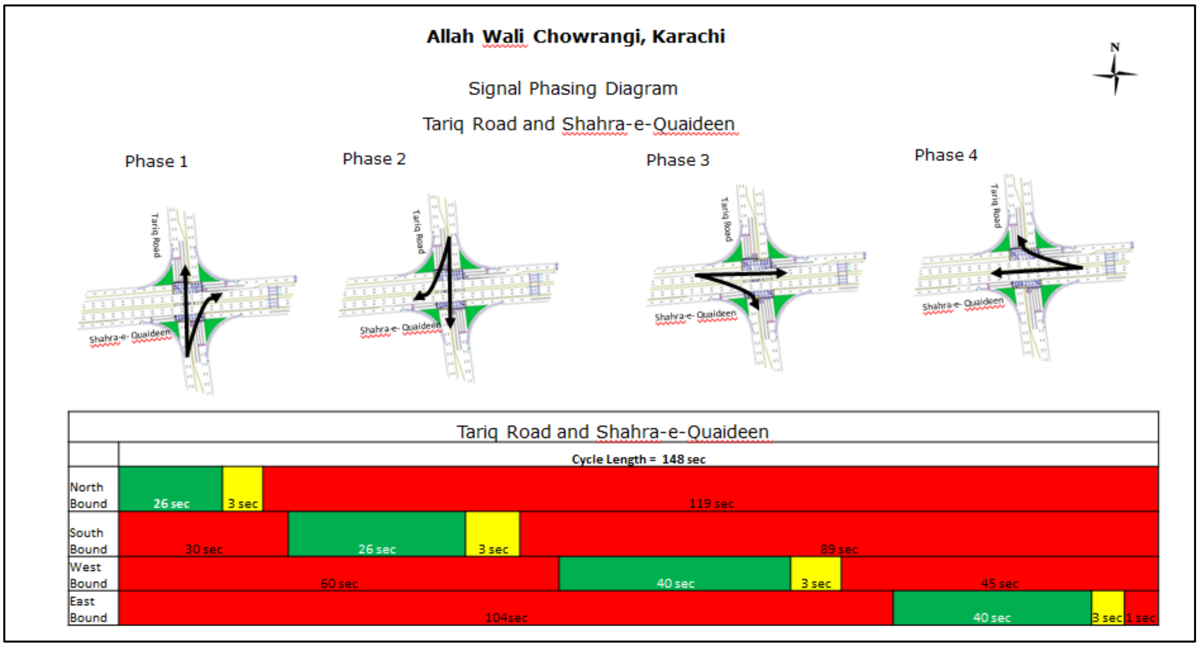


Figure 3.200: Signal Timings at Junction between Tariq Road and Shahra-e-Quaideen

Junction between Tariq Road and Shahra-e-Quaideen is also 4 legged signalized junctions and has the maximum green time given to the West and East direction because of the major flows on Shahra-e-Quaideen which is 40 sec. Other directions mainly from North and South direction have 26 sec green time for traffic flow.

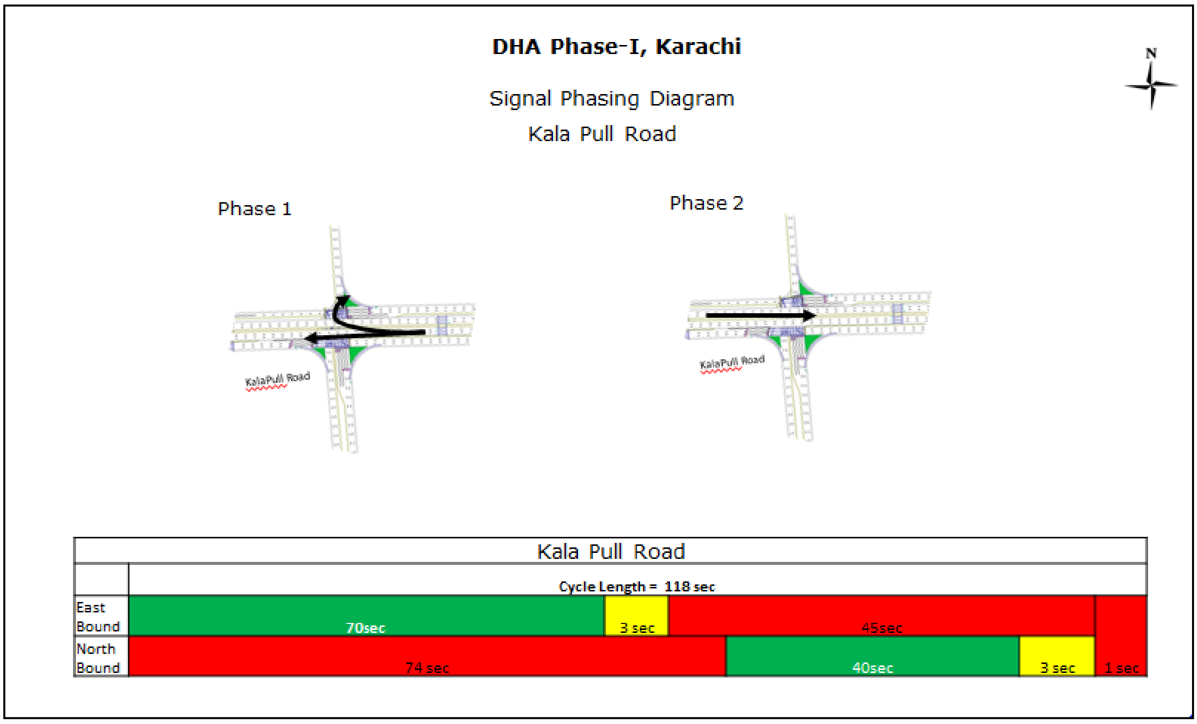


Figure 3.201: Signal Timings at Junction Kala Pull Road

This Junction is at Kala Pull Road with a major East bound flow having 70 sec of green time and 40 sec of green time for the traffic moving in through direction from North Bound.

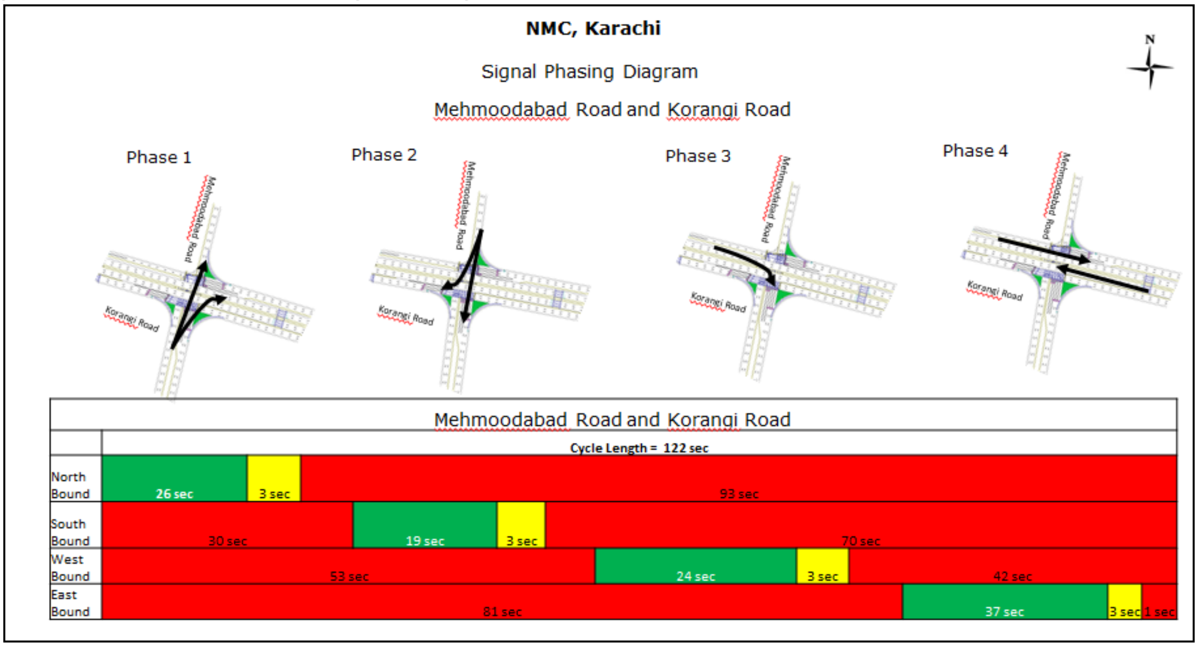


Figure 3.202: Signal Timings at Junction between Mehmood Road and Korangi Road

Junction between Mehmoodabad Road and Korangi Road is also a 4 legged junction. The major traffic flow is from East and west bound through movement with green time is 37 sec. Traffic taking right turn from Mehmoodabad Road towards the minor Street having green time of 24 sec. whereas, traffic moving in north and south bound direction have green time of 26 secs and 19 secs respectively.

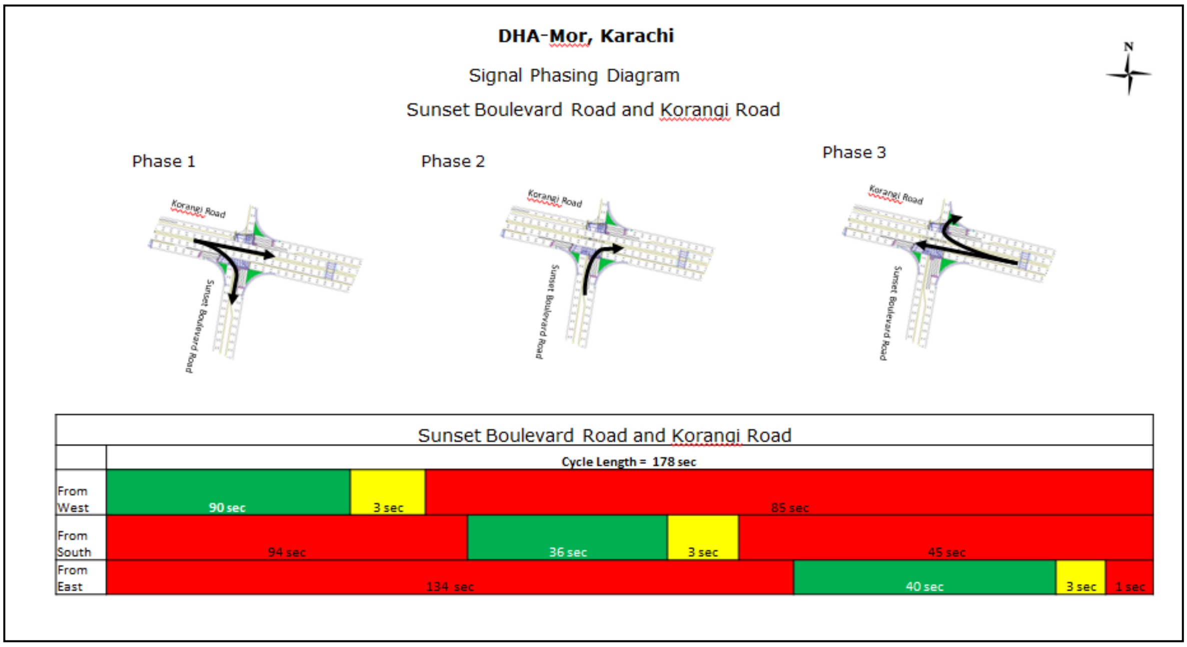


Figure 3.203: Signal Timings at Junction between West Avenue and Korangi Road

Junction between West Avenue and Korangi Road is a 4 legged junction and has the maximum green time given to the flow from east and west direction which is 46 sec. Other green time for two directions i.e. Northbound and South bound is 26 sec.

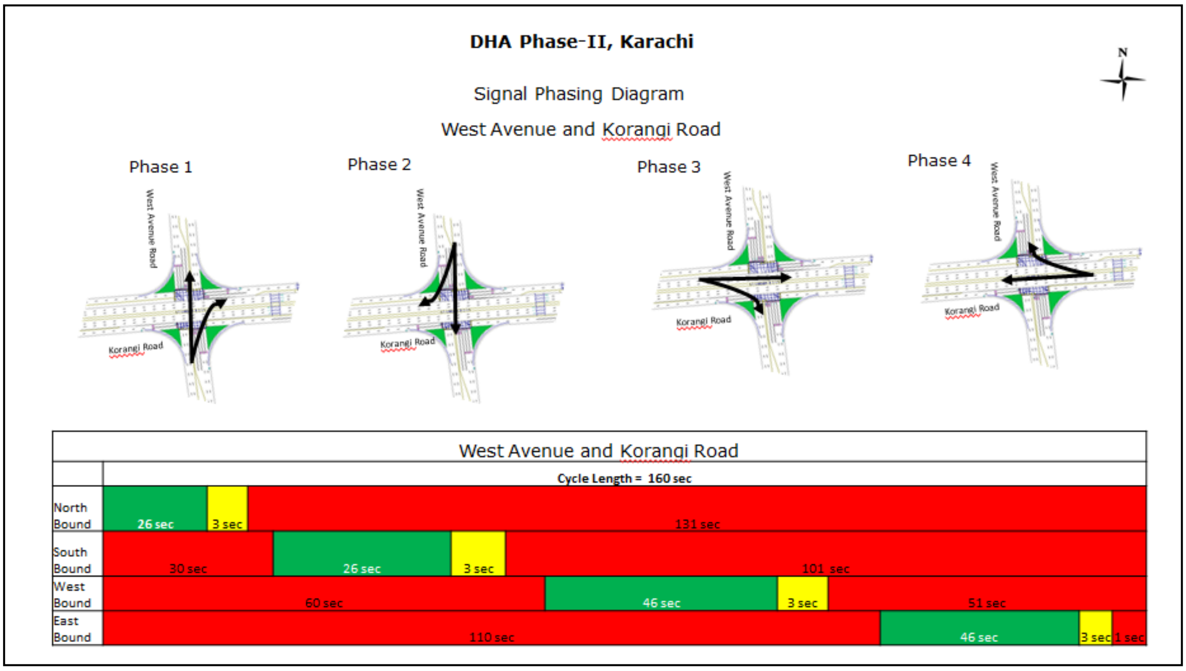


Figure 3.204: Signal Timings at Junction between Sunset Boulevard Road and Korangi Road

Junction between Sunset Boulevard Road and Korangi Road is a 3 legged signalized junction with a maximum green time of 90 sec given to traffic moving from West. Traffic turning right from South direction with a green time of 36 sec. the other one has green time of 40 secs for the traffic turning right from and going straight Korangi road.

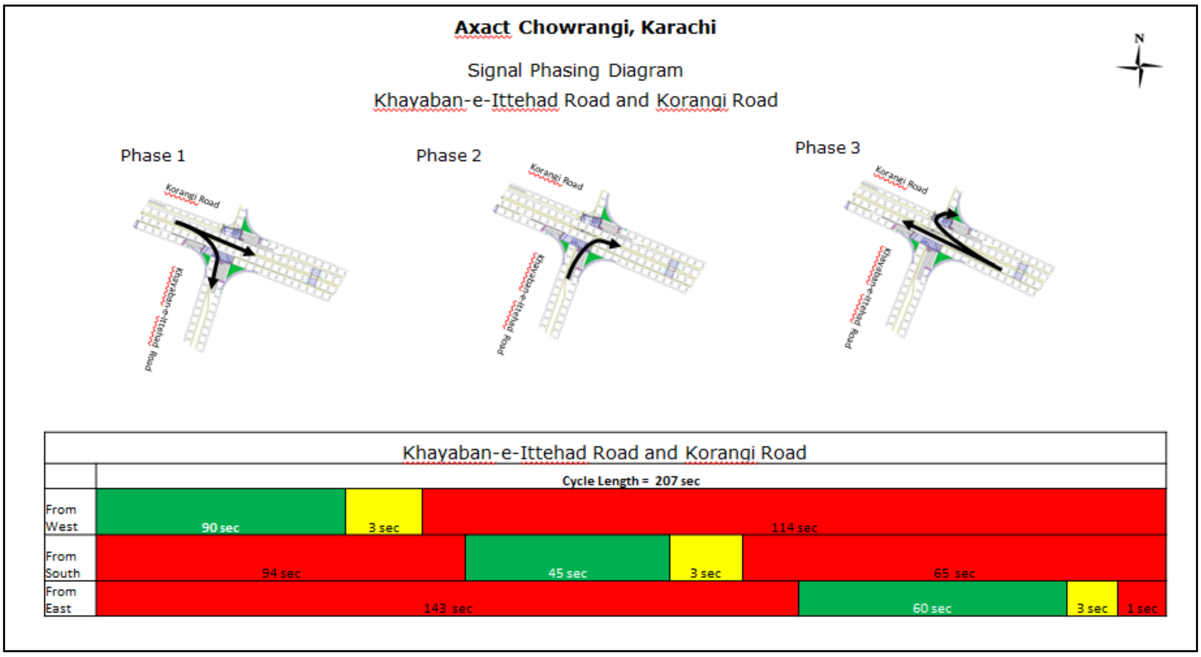


Figure 3.205: Signal Timings at Junction between Khayaban-e-Ittehad Road and Khyber Road

Junction between Khayaban-e-Ittehad Road and Korangi Road is a 3 legged signalized junction and pretty much similar as DHA Mor Junction. Traffic turning right and staright from Korangi Road has a maximum green time of 90 sec. from Khayaban-e-Ittehad Road traffic turning right with a green time of 45 sec. The other one has green time of 60 secs for the flow from East Bound.

3.10. Travel Speed Surveys

This survey was conducted on main Corridors of BRT routes in the first phase. This survey was conducted on any typical weekday. All roads having main Corridor BRT routes were covered under this survey. As discussed earlier, this survey was conducted through 'Floating Car Technique' and hence an enumerator was travelling in a private vehicle in mixed traffic at a speed possible along the Right of Way (ROW).

The travel time survey summary is shown in the table below.

Table 3.38: Travel Time Summary for Red Line

Direction		Time		
From	To	Start Time (Hrs)	End Time (Hrs)	Travel Time (mins)
Numaish	Malir Halt	7:08	7:45	0:37
		8:01	9:04	1:03
		9:07	9:50	0:43
Malir Halt	Numiash	7:04	7:42	0:38
		8:02	8:46	0:44
		9:11	10:08	0:57

The travel time survey was conducted in a way that the peak hours were chosen from 7:00 am to 10:00 am in a particular direction i.e Numaish to Malir Halt and 3 runs were generated in both directions. The average travel time in minutes from Numaish to Malir Halt and Malir Halt to Numaish were 0.47 min & 0.46 min respectively.

The travel time survey summary for Yellow Line is shown in the table below.

Table 3.39: Travel Time Summary for Yellow Line

Direction		Time		
From	To	Start Time (Hrs)	End Time (Hrs)	Travel Time (mins)
Numaish	Dawood Chorangi	7:21	8:09	0:48
		7:53	8:40	0:47
		8:47	10:18	1:31
Dawood Chorangi	Numiash	7:03	7:56	0:53
		8:00	8:54	0:54
		9:22	10:09	0:47

The travel time survey was conducted in a way that the peak hours were chosen from 7:00 am to 10:00 am in a particular direction i.e Numaish to Dawood Chorangi and 3 runs were generated in both directions. The average travel time in minutes from Numaish to Dawood Chorangi and Dawood Chorangi to Numaish were 1.02 min & 0.51 min respectively.

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUT 1.1B AND OUTPUT 4.1B

RED AND YELLOW LINE - TRANSPORT DEMAND MODELLING

July 2018

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

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1. Introduction

The objective of this output is to present the transport model, detailing all the stages of the development of both supply and demand models. For this reason, this text has a greater emphasis on the surveys that were directly used to build the model, focusing on attribute inputs.

This product is part of the Outputs 1.1 (Complementary Surveys and Transport Demand Modelling).

2. Complementary Traffic Surveys

In order to analyse Karachi's public transport scenario and to gather appropriate information to make the transport model, complementary traffic surveys were performed. Table 1 summarizes the surveys that were conducted.

Table 1: Complementary surveys conducted

Type of Survey	Location	Number of days	Time of the day	Sample
Road Network Inventory Survey	Major roads for inventory survey for BRT Red Line: 1 - University Road from Safoora Chowrangi to Jail Chowrangi 2 - New M. A. Jinnah Road From Jail Chowrangi to Mazar e Quaid Major roads for inventory survey for BRT Yellow Line: 1 - Korangi Industrial Area Road from Dawood Chowrangi to KPT Flyover 2 - Korangi Road from KPT Flyover to FTC Interchange 3 - Shahrah-e-Faisal from FTC To Nusery 4 - Shahrah-e-Quaideen from Nursey to Numaish			

Type of Survey	Location	Number of days	Time of the day	Sample
Volume Count & Occupancy Survey	1 - M.A Jinnah Road after Numaish 2 - Shahra e Quaideen near Allah Wali Chowrangi 3 - Shahra e Faisal near Karsaz 4 - Korangi Road near Akhter Colony 5 - Korangi Road near Shan Chowrangi 6 - Korangi Road near Awami Colony 7 - Korangi Road near Singer Chowrangi 8 - Landhi Industrial Area Road near Dawood Chowrangi 9 - Korangi Road near Kala Pull 11 - Shahra-e-Quaideen near Society Office 12 - Korangi Road near Shan Chowrangi 13 - Korangi Road near Mansehra Chowrangi 14 - Landhi Road 15 - Korangi Road near Nasir Colony 16 - Shah Faisal Town near Pak Sadaat Colony 17 - Shah Fraisal Colony near Natha Khan Brdige 18 - Malir Naddi Bridge Near Quaidabad 19 - Shaheed e Millat Expressway Near Manzoor Colony 20 - Korangi Road near Korangi Crossing 21 - Korangi Road after KPT Interchange 22 - M.A Jinnah Road near Jama Cloth 23 - Sir Shah Suleman Road Near Essa Nagri 24 - Karsaz Road near National Stadium	Locations 5 and 35: 7 days (an entire week). Locations 4 and 40: 3 days (1 weekdays, 1 Saturday and 1 Sunday). Other locations: 1 day (1 weekday).	Locations 5, 4, 35 and 40: 15 hours per day (7AM to 10PM). Other locations: 3 hours per day - morning peak (7AM to 10AM).	Volume Count Survey was performed continuously capturing 100 percent of vehicles travelling in both directions for each of the mentioned vehicle categories. Vehicle Occupancy Survey was conducted on sample basis. The enumerators were instructed to capture the maximum number of vehicles, however the target was to get a sample of at least 50 percent of passing vehicles for each category, direction and time interval.

Type of Survey	Location	Number of days	Time of the day	Sample
Volume Count & Occupancy Survey (cont.)	25 - Rashid Minhas Road near UBL Sports Complex 26 - Manghopir Road near Pakistan Quarters 27 - Mauripur Road Near Gulbai 28 - Shahrae Humayun Near Ayesha Manzil 29 - Manghopir Road near Metro Super Store 30 - N-25 Road Near Caltex pump 31 - Shahrae Usman Road Near Nagan Chowrangi 32 - New Karachi near Anda Morr 33 - Estate Avenue near Glaxo Smith Kline Industry 34 - Nazimabad near Baqai Hospital 35 - University Road nearAShfaq Memorial Hospital 36 - University Road Near Askari Park 37 - University Road Near Safari Park 38 - University Road Near Rizwan Society 39 - University Road near Karachi University 40 - New M A Jinnah Road near Islamia College 41 - Khayaban e Roomi Near Forum Mall 42 - M.A. Jinnah Road Near Tower 43 - Moulvi Tameezuddin Khan road near Bahria Complex III 44 - Mauripur Road Near Wazir Mansion Station *(Survey was not conducted at point 10 due to security concerns, as explained in Appendix A)*			

Type of Survey	Location	Number of days	Time of the day	Sample
Existing Bus Route Mapping	Routes surveyed for BRT Red Line: Large Bus: 1 - 4-M: from NIPA to Empress Market Mini Bus: 2 - F-11: from NIPA to JAIL CHOWRANGI 3 - G-3: from SAFORA to Tower 4 - G-17: from SAFORA to SAFARI PARK 5 - G-7: from SAFORA to SUBZI MANDI Coach: 6 - Gulistan: from NIPA to Tower 7 - Shiraz: from SAFORA to Tower 8 - Safari: from SAFARI PARK to JAIL CHOWRANGI			All existing Public Transport routes that are overlapping with Red Line and Yellow Line BRTs corridors were mapped under this type of survey.

Type of Survey	Location	Number of days	Time of the day	Sample
Existing Bus Route Mapping (cont.)	9 - Super hasan zai: from NIPA to JAIL CHOWRANGI 10 - Masood: from SAFORA to NIPA Routes surveyed for Yellow Line: Large Bus: 1 - 1-L Kala Pul Singer Chowrangi Mini Bus: 2 - F-11 Noorani Kabab Dawood Chowrangi 3 - D-11 KPT Flyover Dawood Chowrangi 4 - F-21 KPT Flyover Murtaza Chowrangi 5 - M-1 KPT Flyover Shan Chowrangi Coach: 6 - W-22 Noorani Kabab KPT Flyover 7 - X-23 Brooks Chowrangi Dawood Chowrangi 8 - Mashriq Kala Pul Dawood Chowrangi 9 - Shama Noorani Kabab KPT Flyover			

Type of Survey	Location	Number of days	Time of the day	Sample
Public Transport Frequency Survey	Locations surveyed for BRT Red Line: 1 - Dawood University (New M.A. Jinnah Road) 2 - Bait-ul-Mukkaram Masjid (University Road) 3 - Metro Store (University Road) 4 - Karachi University Locations surveyed for BRT Yellow Line: 1 - Society Office (Shahra-e-Quideen) 2 - Shahra-e-Faisal between FTC & Nursery 3 - Akhtar Colony (Korangi Road) 4 - Korangi Road between Brooks & Shaan	A weekday selected from Monday to Thursday.	12 hours starting at 7AM and ending at 7PM.	
Stop-Based Origin & Destination Survey	Locations surveyed for BRT Red Line: 1 - NIPA 2 - Karachi University 3 - NED 4 - Safoora 5 - Jail 6 - Civic Centre 7 - Numaish	A weekday selected from Monday to Thursday.	Morning peak period (7AM to 10AM).	Sample size for BRT Red Line: 1 - NIPA: 310 2 - Karachi University: 208 3 - NED: 122 4 - Safoora: 236 5 - Jail: 332 6 - Civic Centre: 516 7 - Numaish: 372 Total for BRT Red Line: 1724

Type of Survey	Location	Number of days	Time of the day	Sample
Stop-Based Origin & Destination Survey (cont.)	Locations surveyed for BRT Yellow Line: 1 - FTC 2 - Mc Donalds 3 - Allah Wali 4 - Numaish 5 - Akhter 6 - Defence Mor 7 - Defence Motors 8 - Dawood 9 - Shan			Sample size for BRT Yellow Line: 1 - FTC: 247 2 - Mc Donalds: 181 3 - Allah Wali: 196 4 - Numaish: 372 5 - Akhter: 242 6 - Defence Mor: 156 7 - Defence Motors: 133 8 - Dawood: 336 9 - Shan: 337 Total for BRT Yellow Line: 2200
On Board Origin & Destination Survey	Routes surveyed for BRT Red Line: 1 - Gulistan 2 - Shamma 3 - 11-C 4 - G-3 5 - G-17 6 - A-3 7 - X-23	A weekday selected from Monday to Thursday.	Morning period.	Routes surveyed for BRT Red Line: 1 - Gulistan: 121 2 - Shamma: 130 3 - 11-C: 138 4 - G-3: 109 5 - G-17: 122 6 - A-3: 147 7 - X-23: 126 Total for BRT Red Line: 893

Type of Survey	Location	Number of days	Time of the day	Sample
On Board Origin & Destination Survey (cont.)	Routes surveyed for BRT Yellow Line: 1 - Ilyas 2 - Marwat 3 - Mashriq 4 - New Afridi 5 - 9-C 6 - C-1 7 - D-11			Routes surveyed for BRT Yellow Line: 1 - Ilyas: 123 2 - Marwat: 105 3 - Mashriq: 110 4 - New Afridi: 123 5 - 9-C: 122 6 - C-1: 141 7 - D-11: 146 Total for BRT Yellow Line: 870
Boarding & Alighting Survey	Routes surveyed for BRT Red Line: 1 - Gulistan 2 - Shamma 3 - 11-C 4 - G-3 5 - G-17 6 - A-3 7 - X-23 Routes surveyed for BRT Yellow Line: 1 - Ilyas 2 - Marwat 3 - Mashriq 4 - New Afridi 5 - 9-C 6 - C-1 7 - D-12	A weekday selected from Monday to Thursday.	Morning period.	It was conducted 3 times for each direction of each route.

Type of Survey	Location	Number of days	Time of the day	Sample
Stated Preference Survey (Public Transport)	Locations surveyed for BRT Red Line: 1 - Safoora Chowrangi 2 - Karachi University 3 - NIPA 4 - Civic Centre 5 - Jail Chowrangi 6 - Numaish Locations surveyed for BRT Yellow Line: 1 - Dawood Chowrangi 2 - Shan Chowrangi 3 - Akhtar Colony 4 - DHA 5 - FTC 6 - Numaish	A weekday selected from Monday to Thursday.	Morning peak period (7AM to 10AM).	Locations surveyed for BRT Red Line: 1 - Safoora Chowrangi: 94 2 - Karachi University: 86 3 - NIPA: 78 4 - Civic Centre: 91 5 - Jail Chowrangi: 73 6 - Numaish: 45 Total for BRT Red Line: 467 Locations surveyed for BRT Yellow Line: 1 - Dawood Chowrangi: 90 2 - Shan Chowrangi: 90 3 - Akhtar Colony: 90 4 - DHA: 93 5 - FTC: 100 6 - Numaish: 45 Total for BRT Yellow Line: 508
Stated Preference for Private Transport Survey	On all major gas stations along the corridor: Locations surveyed for BRT Red Line: 1 - Safoora Chowrangi 2 - NIPA 3 - Civic Centre 4 - Agha Khan 5 - Numaish	A weekday selected from Monday to Thursday.	Morning peak period (7AM to 10AM).	Locations surveyed for BRT Red Line: 1 - Safoora Chowrangi: 36 2 - NIPA: 48 3 - Civic Centre: 72 4 - Agha Khan: 48 5 - Numaish: 60 Total for BRT Red Line: 264

Type of Survey	Location	Number of days	Time of the day	Sample
Stated Preference for Private Transport Survey (cont.)	Locations surveyed for BRT Yellow Line: 1 - Dawood Chowrangi 2 - Kala Pull 3 - Noorani 4 - Numaish			Locations surveyed for BRT Yellow Line: 1 - Dawood Chowrangi: 48 2 - Kala Pull: 48 3 - Noorani: 94 4 - Numaish: 60 Total for BRT Yellow Line: 250
Signal Assessment Survey	At all signalized junctions that lie within BRT Yellow Line Corridor (it was not conducted for Red Line because this line does not have signals).	A weekday selected from Monday to Thursday.	Morning peak period (7AM to 10AM).	Timings of all signalized junctions that are signalized even after the implementation of the BRT corridors, were collected from the field.
Travel Speed Survey	At the entire BRT Corridor.	A weekday selected from Monday to Thursday.	Morning peak period (7AM to 10AM).	3 separate runs were carried out between 7AM and 10AM at hourly basis from both directions.

Next, it is presented specifically the surveys that directly affect the model and its calibration. The processing of all the surveys is treated in further detail on Appendix A –Complementary Surveys, from Interim Report 1.

2.1 Origin and Destination Survey

The origin-destination trip survey was performed in two different ways, as described and presented in the following items.

2.1.1 Stop-based Origin and Destination Survey

The Stop-based Origin Destination Survey was performed at the main bus stops of the Red and Yellow Lines alignments, as shown in Figure 1 bellow. At the Red Line alignment, the survey was performed in seven locations, and at the Yellow Line alignment, it was performed in nine locations (one location was used for both line alignments). Even though there is a different number of locations, the total number of samples for each line alignment was similar.

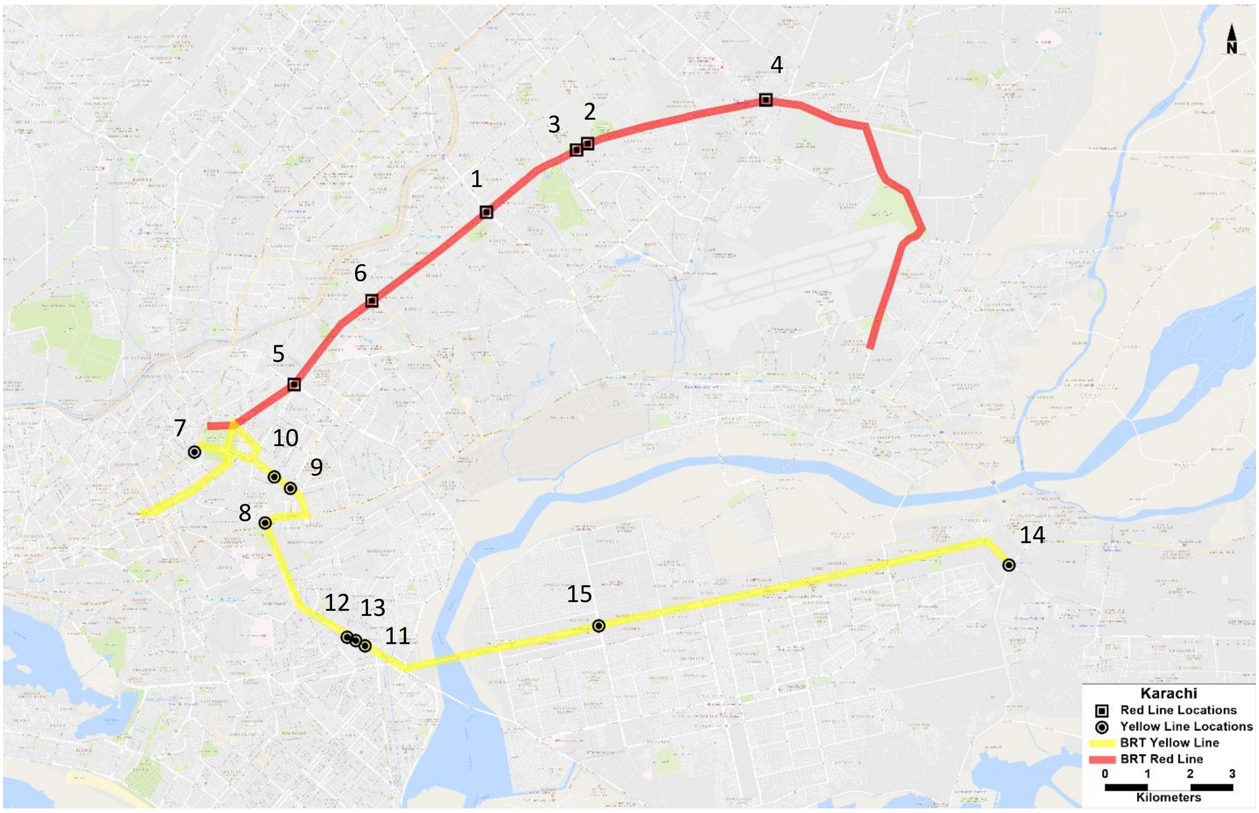

Figure 1: Stop-based OD Survey Locations

The Public Transport User Interview Survey (PTUIS) was carried out to collect origin and destination information of passengers using existing Public Transport. The questionnaire has been developed to gather information on their origin and destination, trip purpose and reason of mode choice. The interviews were conducted on major existing Public Transport bus stops, and the following specifications were considered for the surveys:

- The survey was conducted from 07:00 to 10:00 during Morning Peak for all major bus stop locations;
- The survey was conducted on a weekday selected from Monday to Thursday. Public holidays, strike days or any day not representing typical traffic on a particular location were excluded from the survey schedule.

The survey locations are described in the following tables.

Table 2: Survey Locations for Stop-based OD Survey Red Line

Site ID	Location
1	NIPA
2	Karachi University
3	NED
4	Safoora
5	Jail
6	Civic Centre
7	Numaish

Table 3: Survey Locations for Stop-based OD Survey Yellow Line

Site ID	Location
7	Numaish
8	FTC
9	Mc Donalds
10	Allah Wali
11	Akhter
12	Defence Mor
13	Defence Motors
14	Dawood
15	Shan

Each origin and destination information obtained from the survey was attributed to the correspondent traffic zones (explained in item **3.1.1**), therefore forming OD pairs from one traffic zone to another. These were all consolidated into initial OD matrices, with origins in the lines and destinations in the columns.

For the expansion of the matrices originated by the Stop-based OD, data from three other surveys was used:

- Frequency Surveys: observed frequency for the public transport routes of each stop-based OD locations;
- Boarding Alighting Surveys: number of boarding and alighting at the bus stops near the stop-based OD locations;
- Volume Count and Occupancy Survey: volume count of public transport vehicles and average occupancy at the stop-based OD locations.

The samples of each survey location were expanded based on the total number of boarding and alighting at the bus stops located near the stop-based survey location. The total number of boarding and alighting of each survey location was adjusted based on the public transport volume count data for each location and the frequency of the public transport routes selected for the Boarding Alighting Surveys.

With the expanded matrix of the Stop-based OD Surveys, it was possible to analyse the origins and the destinations of trips performed by potential Red and Yellow lines users during the morning peak period (07:00 to 10:00am). The distribution of origins and destinations of these public transportation trips is shown in the following map (Figure 2), with the overview of entire Karachi.

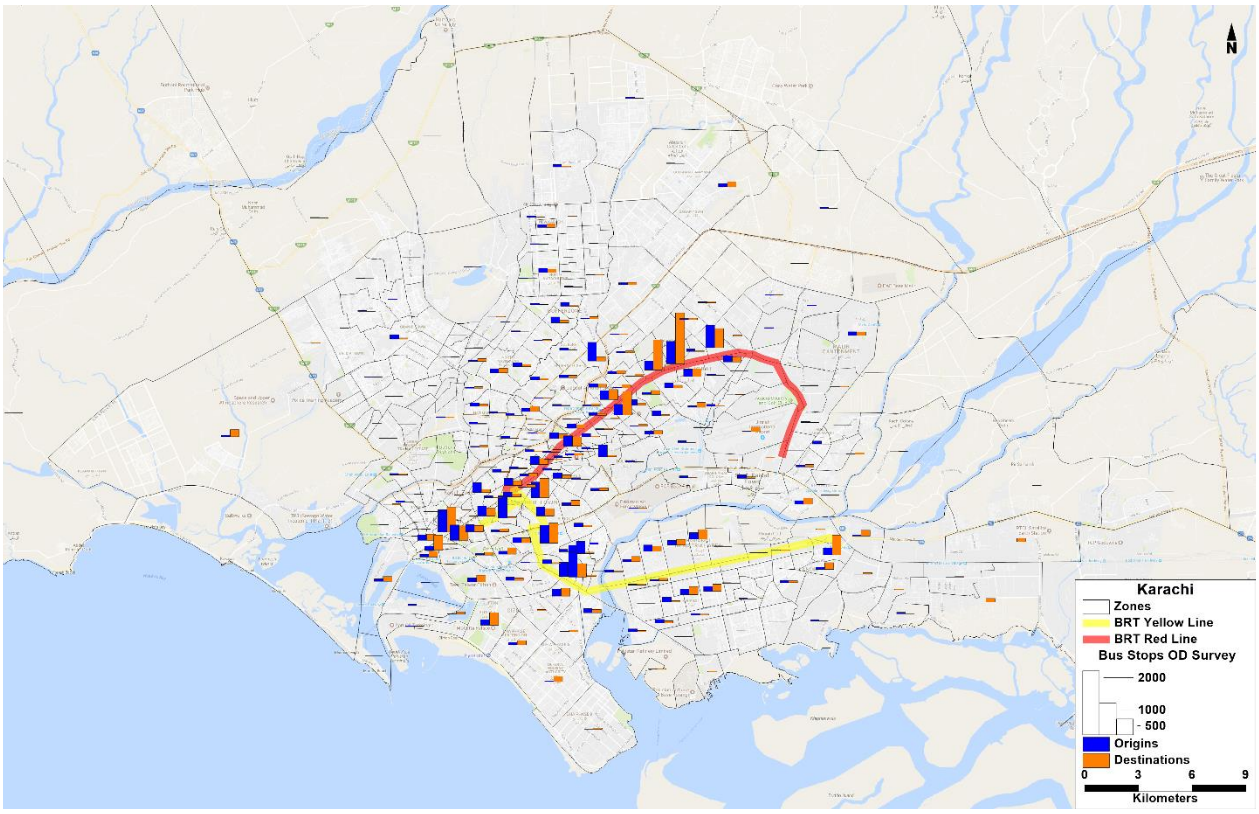

Figure 2: Number of origins and destinations identified in Stop-Based OD Survey (07:00 to 10:00 am)

The following map (Figure 3) is zoomed in the Red and Yellow lines alignments with data by traffic zones, which are more detailed than Councils Units, as described in item 3.1.1 – Zoning.

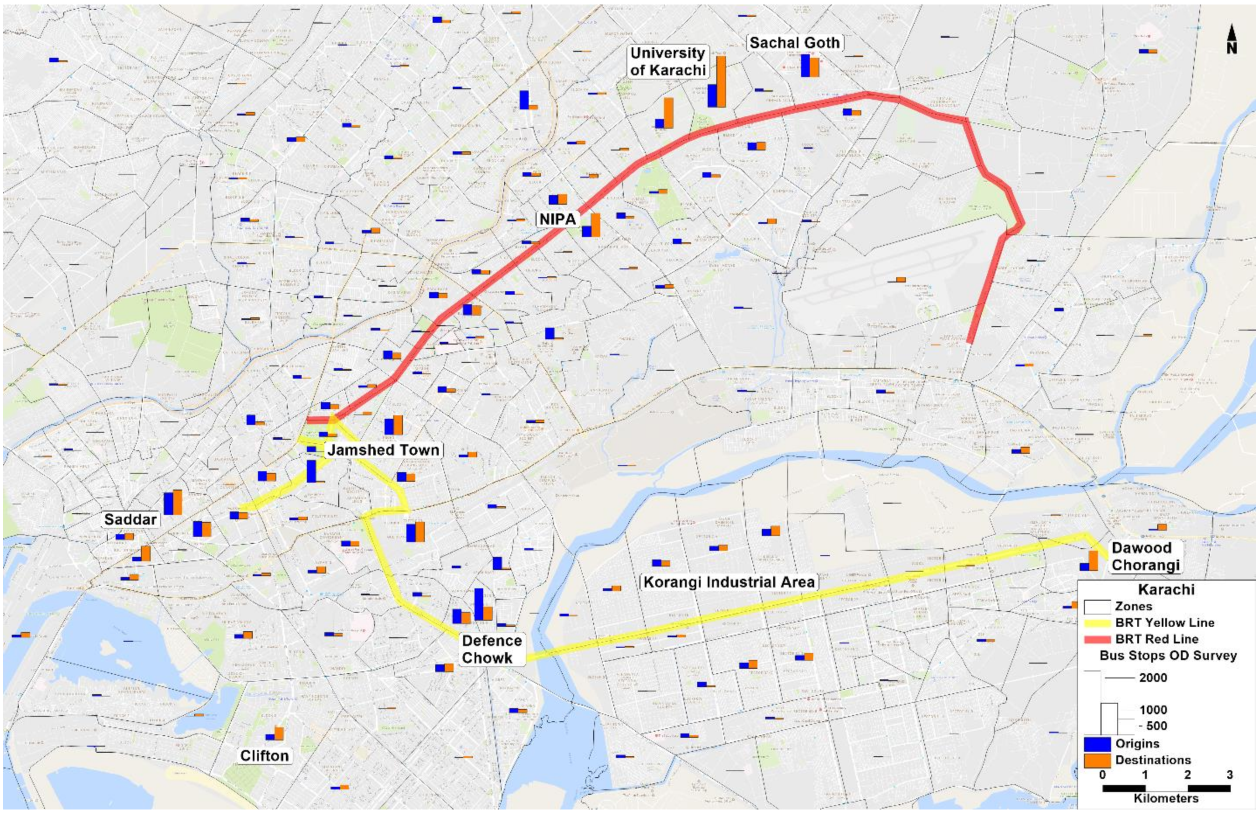

Figure 3: Origins and destinations identified in Stop-Based OD Survey (07:00 to 10:00 am)

As shown in the picture above, most public transportation trips originate near Defence Chowk, Sachal Goth, University of Karachi and in Saddar Town, while most destinations of public transportation trips are to Dawood Chorangi, Sachal Goth, University of Karachi, Jamshed Town and Saddar Town. The north region of the Red Line Alignment draws attention for the volume of destinations observed in the survey, showing the importance of this region to the Karachi city. Another relevant part of the city is the middle part of the Red Line Alignment, near NIPA, where a large number of destinations is observed. Regarding the Yellow Line Alignment, Defence Chowk draws attention due to the high volume of origins, while Dawood Chorangi presents a high destinations volume.

2.1.2 On-board Origin and Destination Survey

In addition to the Stop-based Origin and Destination Survey, it was also conducted the On-board Origin and Destination Survey. From this data, it was possible to understand additional trips made by public transport in Karachi. The surveys were done in 14 previously selected public transport routes. Those routes were selected based on the results of frequency surveys and the spatial distribution along the Red and Yellow Lines alignments. The following picture shows the spatial distribution of the selected routes for the On Board Surveys, presented in Table 1.

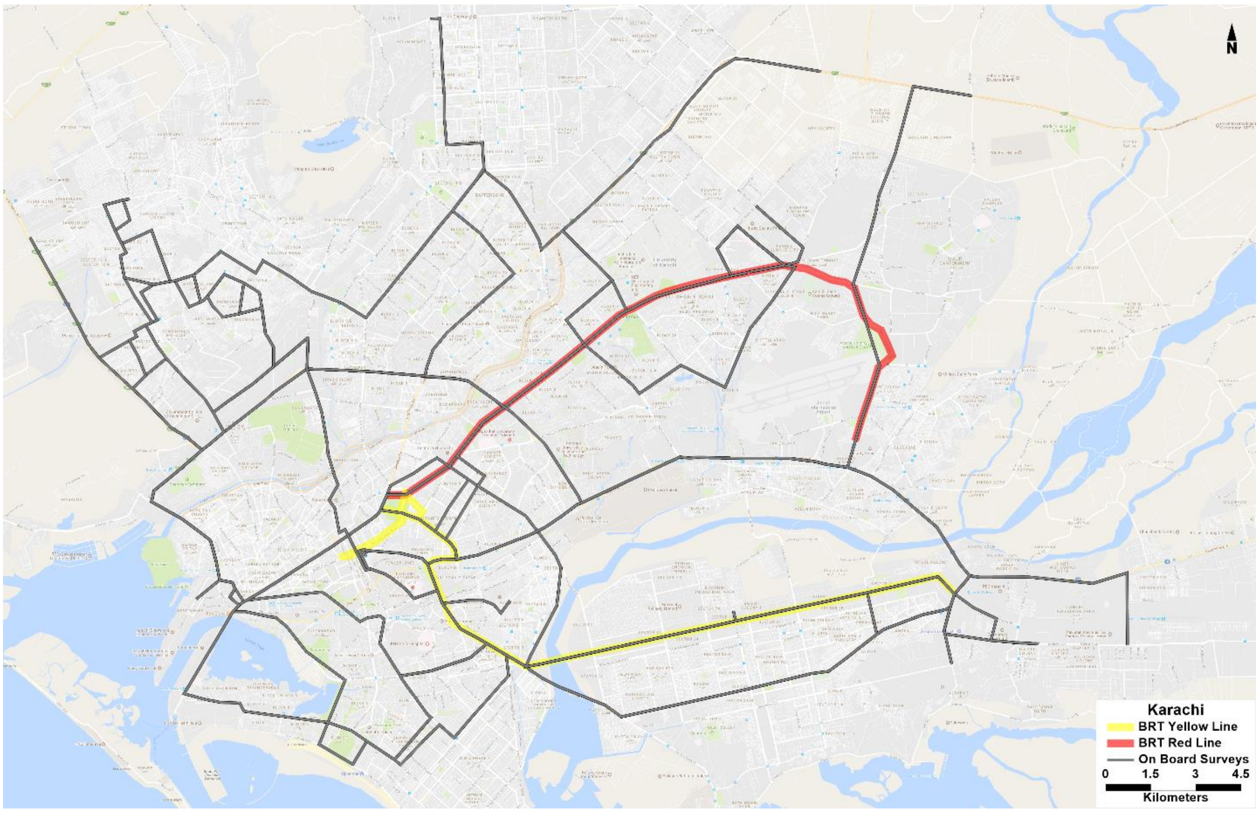

Figure 4: Spatial Distribution of the 14 public transport routes selected for the On Board Surveys

The same process presented before (for stop-based Origin and Destination survey) was used to create the initial OD matrices. Each origin and destination information was attributed to the correspondent traffic zones, therefore forming OD pairs from one traffic zone to another. These were all consolidated into initial OD matrices, with origins in the lines and destinations in the columns.

For the expansion of the matrices originated by the On Board OD, data from two other surveys was used:

- Frequency Surveys: observed frequency per route in four locations at Red Line alignment and in other four locations in Yellow Line alignments;
- Boarding Alighting Surveys: number of boarding (total number of passengers) per public transport route for each of the 14 selected routes.

The samples of each route were expanded based on the total number of boarding for the route and the frequency observed during the morning peak hour. With the expanded matrix of the On Board OD Surveys, it was possible to analyse the origins and destinations of trips performed in these selected public transport routes. The distribution of origins and destinations of these public transportation trips is shown in the following map (Figure 1) with the overview of entire Karachi.

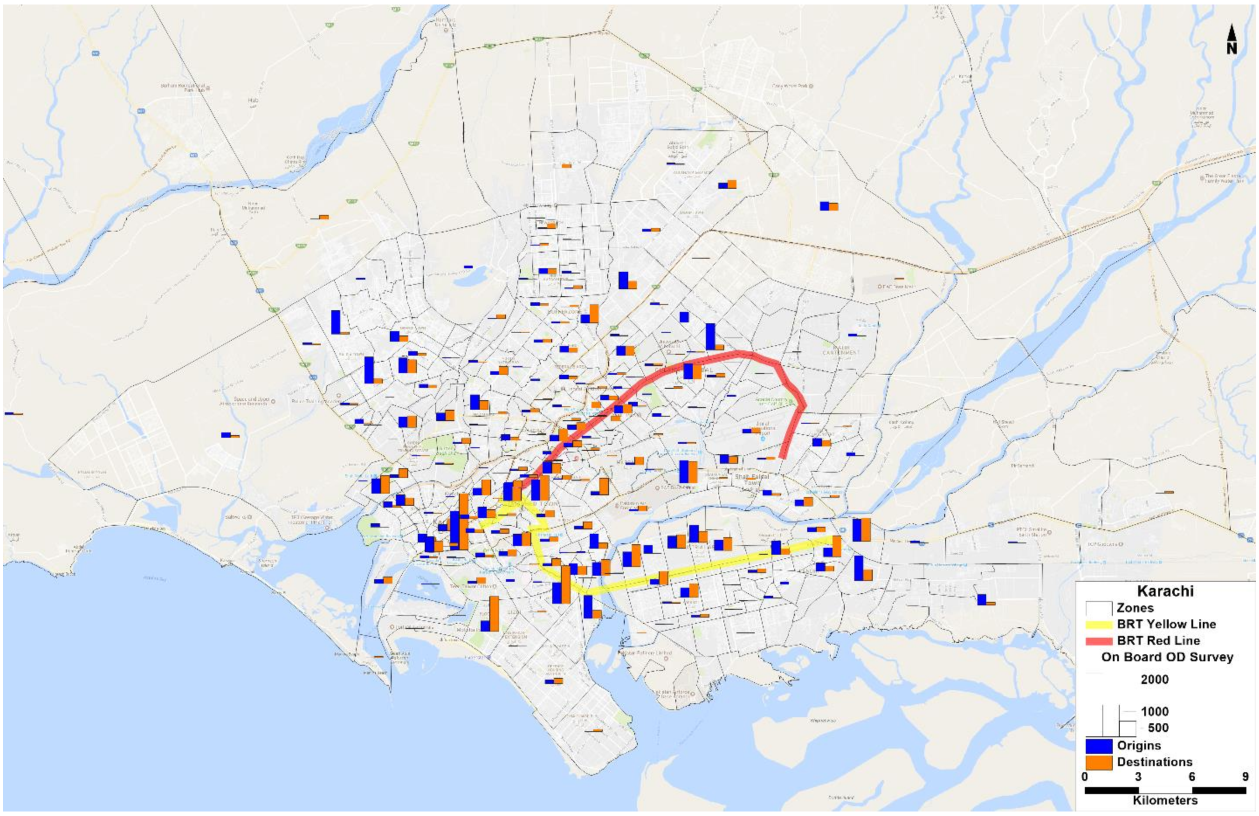

Figure 5: Karachi origins and destinations identified in On-board OD Survey

The following map is zoomed in the Red Line and Yellow Line alignments with data by traffic zones, which are more detailed than Councils Units.

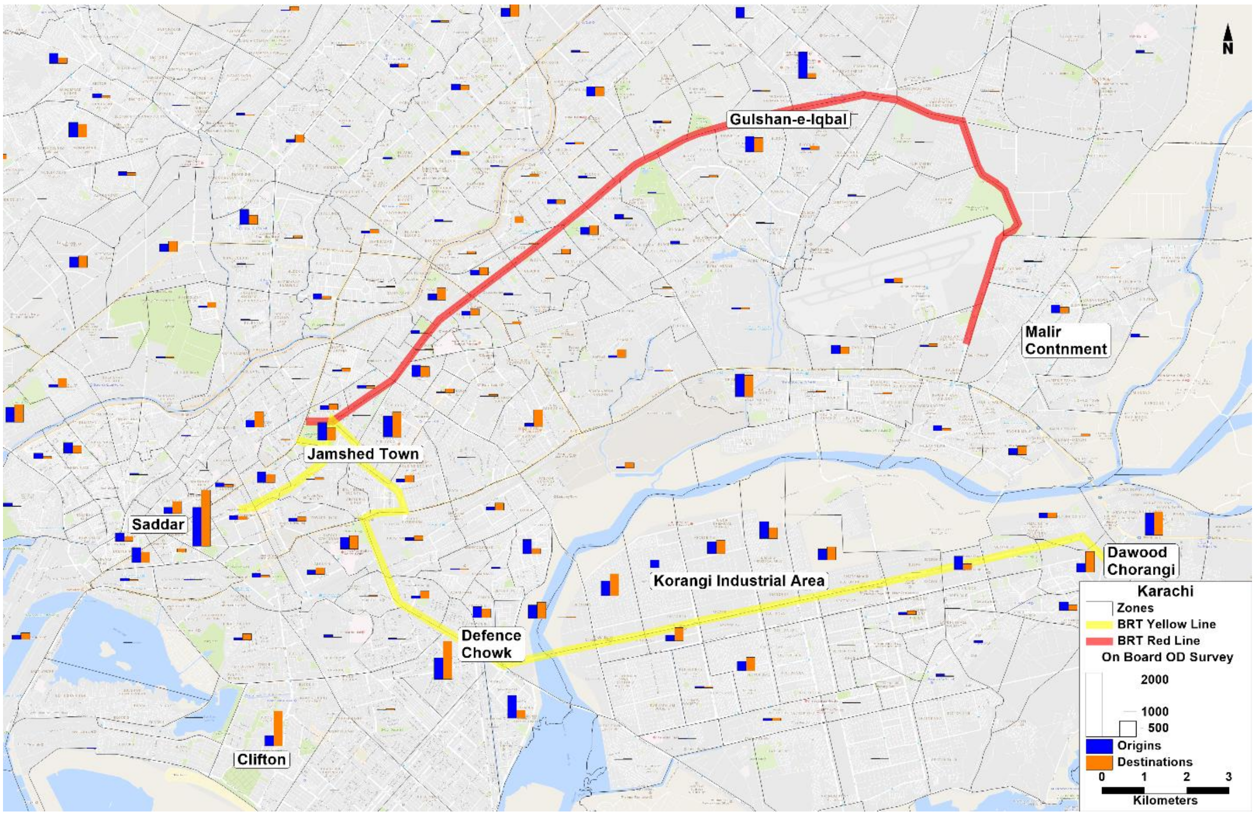

Figure 6: Origins and destinations identified in On Board OD Survey

As can be seen in the map above, the origins and destinations are fairly well distributed among many regions in Karachi. The main areas regarding the origins of trips are Saddar Area, Gulshan-e-Iqbal, Defence Chowk Korangi Industrial Area and Dawood Chorangi, while the destinations occur mainly in Saddar, Clifton, Jamshed Town, Korangi Industrial Area and Dawood Chorangi. Some places like Dawood Chorangi, Jamshed Town and Saddar draw attention due to the high volume of trips and the equilibrium between origins and destinations. These areas are very important for the modelling because they are trip-attracting and trip-producing areas.

2.2 Transport Frequency and Visual Occupancy Survey

The database of the transport frequency and occupancy survey was processed in order to obtain a qualified data of the morning peak hour to be used as input for the model.

The following map shows the locations of the survey, which are also listed in Table 4.

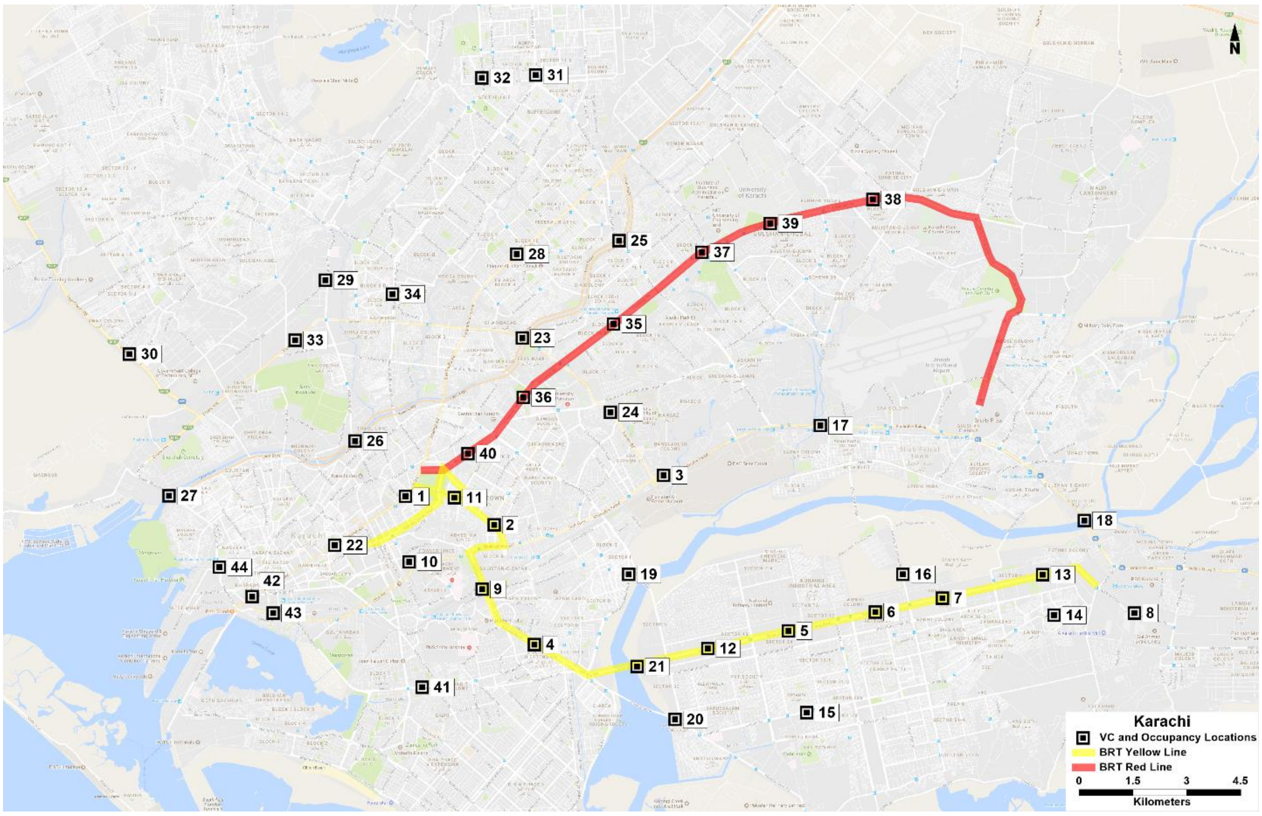

Figure 7: Location of Transport Frequency and Occupancy Surveys

The following table presents the total number of vehicles and passengers observed in each survey location.

Table 4: Total of vehicles and passengers observed in peak hour (AM) for each survey location

Survey ID	Location name	Survey location	Direction	Vehicles / h	Passengers
Location 1	M.A Jinnah Road after Numaish	01-A	From Tower to Numaish	150	4,503
		01-B	From Numaish to Tower	199	7,609
Location 2	Shahra e Quaideen	02-A	From Tariq Road To Nursery	88	1,432

Survey ID	Location name	Survey location	Direction	Vehicles / h	Passengers
	near Allah Wali Chowrangi	02-B	From Nursery To Tariq Road	81	1,239
Location 3	Shahra e Faisal near Karsaz	03-A	From FTC to Drig Road	88	1,935
		03-B	From Drig Road to FTC	117	2,445
Location 4	Korangi Road near Akhter Colony	04-A	FTC To Defence Morr	144	3,652
		04-B	Defence Mor To FTC	141	3,364
Location 5	Korangi Road near Shan Chowrangi	05-A	From Brooks To Shaan	137	3,646
		05-B	From Shaan To Brooks	122	3,344
Location 6	Korangi Road near Awami Colony	06-A	Singer Chow To Bilal Chow	96	1,878
		06-B	Bilal Chow To Singer Chow	114	1,748
Location 7	Korangi Road near Singer Chowrangi	07-A	Singer Chow To Murtaza Chow	107	2,009
		07-B	Murtaza Chow To Singer Chow	93	1,743
Location 8	Landhi Industrial Area Road near Dawood Chowrangi	08-A	Dawood Chow To Hospital Chow	45	768
		08-B	Hospital Chow To Dawood Chow	41	745
Location 9	Korangi Road near Kala Pull	09-A	From FTC to Athtar Colony	150	3,842
		09-B	From Akhtar Colony to FTC	147	2,752
Location 11	Shahra-e-Quaideen near Society Office	11-A	From Mazare Quaid to Nursery	77	1,454
		11-B	From Nursery to Mazare Quaid	81	1,074
Location 12	Korangi Road near Shan Chowrangi	12-A	Shaan Chow To Brooks Chow	128	3,505
		12-B	Brooks Chow To Shaan Chow	152	3,290
Location 13	Korangi Road near Mansehra Chowrangi	13-A	Future Mor To Mansehra Col	83	1,688
		13-B	Mansehra Col To Future Mor	95	1,750
Location 14	Landhi Road	14-A	From Landhi Sarhe Teen To Babar Market	70	2,182
Location 15	Korangi Road near Nasir Colony	15-A	From Landhi To Korangi Cross	142	4,824
		15-B	From Korangi Cross To Landhi	110	3,605
Location 16	Shah Faisal Town near Pak Sadaat Colony	16-A	Singer Chowrangi To Shama	17	304
		16-B	Shama To Singer Chowrangi	104	2,866
Location 17	Shah Fraisal Colony near Natha Khan Brdige	17-A	From Drig Road to Natha Khan	95	1,768
		17-B	From Natha Khan to Drig Roa	123	1,897
Location 18	Malir Naddi Bridge Near Quaidabad	18-A	From Malir 15 To Quiadabad	197	3,738
		18-B	From Quiadabad To Malir 15	158	3,020

Survey ID	Location name	Survey location	Direction	Vehicles / h	Passengers
Location 19	Shaheed e Millat Expressway Near Manzoor Colony	19-A	From Baloch Col. To Iqra Uni	61	1,561
		19-B	From Iqra Uni To Baloch Col.	51	1,610
Location 20	Korangi Road near Korangi Crossing	20-A	From Korangi Cross To KPT	136	2,143
		20-B	From KPT To Korangi Cross	95	1,776
Location 21	Korangi Road after KPT Interchange	21-A	From KPT Inter to Korangi	141	3,055
		21-B	From Korangi to KPT Inter.	124	2,524
Location 22	M.A Jinnah Road near Jama Cloth	22-A	Tower to Guru Mandir	121	2,320
		22-B	Guru Mandir to Tower	148	4,336
Location 23	Sir Shah Suleman Road Near Essa Nagri	23-A	Civic Centre To Gharibabad	134	2,814
		23-B	Gharibabad To Civic Centre	139	3,026
Location 24	Karsaz Road near National Stadium	24-A	Karsaz To Stadium	54	1,373
		24-B	Stadium To Karsaz	72	1,692
Location 25	Rashid Minhas Road near UBL Sports Complex	25-A	From NIPA To Sohrab Goth	104	2,827
		25-B	From Sohrab Goth to NIPA	114	2,885
Location 26	Manghopir Road near Pakistan Quarters	26-A	From Habib Bank To Garden	58	2,060
		26-B	From Garden To Habib Bank	76	1,997
Location 27	Mauripur Road Near Gulbai	27-A	From Gulbai To Tower	126	3,115
		27-B	From Tower To Gulbai	131	3,263
Location 28	Shahrae Humayun Near Ayesha Manzil	28-A	Ayesha Manzil To Karimabad	64	1,139
		28-B	Karimabad To Ayesha Manzil	63	1,074
Location 29	Manghopir Road near Metro Super Store	29-A	From HBL Chowrangi to Orangi	74	1,733
		29-B	From Orangi to HBL Chowrangi	107	2,588
Location 30	N-25 Road Near Caltex pump	30-A	From Kimari To Baldia Town	146	2,918
		30-B	From Baldia Town To Kimari	143	2,987
Location 31	Shahrae Usman Road Near Nagan Chowrangi	31-A	Power House Ch. To Nagan Ch.	110	3,145
		31-B	Nagan Ch. To Power House Ch.	107	2,573
Location 32	New Karachi near Anda Morr	32-A	From Anda Mor To New Karachi	12	267
		32-B	From New Karachi To Anda Mor	15	253
Location 33	Estate Avenue near Glaxo Smith Kline Industry	33-A	From HBL to Habib Oil Mills	114	2,838
		33-B	From Habib Oil Mills To HBL	98	1,842

Survey ID	Location name	Survey location	Direction	Vehicles / h	Passengers
Location 34	Nazimabad near Baqai Hospital	34-A	From Eid Gah To Board Office	66	965
		34-B	From Board Office To Eid Gah	99	2,971
Location 35	University Road nearAShfaq Memorial Hospital	35-A	Civic Centre To NIPA	169	4,142
		35-B	NIPA To Civic Centre	159	3,829
Location 36	University Road Near Askari Park	36-A	Jail Ch. To Hassan Square	156	2,596
		36-B	Hassan Square To Jail Ch.	129	2,176
Location 37	University Road Near Safari Park	37-A	From Safoora To Nipa	95	2,291
		37-B	From Nipa To Safoora	117	2,668
Location 38	University Road Near Rizwan Society	38-A	Mosamyat To Safoora	128	2,859
		38-B	Safoora To Mosamyat	114	2,540
Location 39	University Road near Karachi University	39-A	From Safoora To Samama	75	1,886
		39-B	From Samama To Safoora	94	2,133
Location 40	New M A Jinnah Road near Islamia College	40-A	Islamia College To Jail Ch.	56	1,289
		40-B	Jail Ch. To Islamia College	53	1,041
Location 41	Khayaban e Roomi Near Forum Mall	41-A	Schon Circle To Submarine Ck	52	902
		41-B	Submarine Ck To Schon Circle	52	981
Location 42	M.A Jinnah Road Near Tower	42-A	Tower To Native Jetty	167	3,620
		42-B	Native Jetty To Tower	171	3,540
Location 43	Moulvi Tameezuddin Khan road near Bahria Complex III	43-A	From PIDC To Tower	78	1,913
		43-B	From Tower To PIDC	97	2,392
Location 44	Mauripur Road Near Wazir Mansion Station	44-A	From Tower To Lyari	165	2,621
		44-B	From Lyari To Tower	191	2,868

Finally, the maximum frequency observed for each surveyed public transport route, during the peak period, is presented on the following table. Additional information about these routes are presented on Appendix A, from Interim Report 1, along with all the data regarding complementary surveys done for Karachi BRT Project.

Table 5: Maximum frequency surveyed for routes services

Public Transport Route	Vehicle Type	UC of Origin	UC of Destination	Headway [min]	Frequency [veh/h]
11-C	Large Bus	Azam Basti	Safooran Goth	10.0	6
11-C	Large Bus	Safooran Goth	Azam Basti	9.2	7
16	Large Bus	Cattle Colony	Clifton Cantonment	3.2	19
16	Large Bus	Clifton Cantonment	Cattle Colony	4.6	13
16-D	Large Bus	Cattle Colony	Clifton Cantonment	15.0	4
16-D	Large Bus	Clifton Cantonment	Cattle Colony	15.0	4
17-K	Large Bus	Landhi	Clifton Cantonment	3.0	20
17-K	Large Bus	Clifton Cantonment	Landhi	3.0	20
1-D	Large Bus	Madina Colony	Korangi Town Area	10.0	6
1-D	Large Bus	Korangi Town Area	Madina Colony	15.0	4
1-L	Large Bus	Madina Colony	Bilal Colony	12.0	5
1-L	Large Bus	Bilal Colony	Madina Colony	17.1	4
4-M	Large Bus	Gulzar-e-Hijri	City Railway Colony	3.0	20
4-M	Large Bus	City Railway Colony	Gulzar-e-Hijri	3.0	20
55	Large Bus	Al-Falah Society	Chaki Wara	12.0	5
55	Large Bus	Chaki Wara	Al-Falah Society	15.0	4
9-C	Large Bus	Safooran Goth	Clifton Cantonment	5.0	12
9-C	Large Bus	Clifton Cantonment	Safooran Goth	5.5	12
A-3	Mini Bus	Safooran Goth	Kiamari	3.2	19
A-3	Mini Bus	Kiamari	Safooran Goth	3.3	19
Abdullah Coach	Coach	Quaidabad	Ittehad Town	7.5	8
Abdullah Coach	Coach	Ittehad Town	Quaidabad	6.7	9
BilaL Coach	Coach	Cattle Colony	Ittehad Town	6.0	10
BilaL Coach	Coach	Ittehad Town	Cattle Colony	4.6	13
C-1	Mini Bus	Bilal Colony	Clifton Cantonment	8.0	8
C-1	Mini Bus	Clifton Cantonment	Bilal Colony	10.0	6
City Coach	Coach	Yusuf Goth	Quaidabad	3.0	20
City Coach	Coach	Quaidabad	Yusuf Goth	3.0	20
D-11	Mini Bus	Madina Colony	Akhtar Colony	10.0	6
D-11	Mini Bus	Akhtar Colony	Madina Colony	5.5	12
Data Coach	Coach	Yusuf Goth	Nasir Colony	16.0	4
Data Coach	Coach	Nasir Colony	Yusuf Goth	15.0	4
F-1	Mini Bus	Khokrapar	Gulzar colony	3.0	20
F-1	Mini Bus	Gulzar colony	Khokrapar	3.0	20
F-11	Mini Bus	Muzzafar Abad	Manghopir	4.4	14
F-11	Mini Bus	Manghopir	Muzzafar Abad	3.8	16
F-18	Mini Bus	Yusuf Goth	Bilal Colony	8.6	8
F-18	Mini Bus	Bilal Colony	Yusuf Goth	12.0	5
F-21	Mini Bus	Manghopir	Muzzafar Abad	8.6	8
F-21	Mini Bus	Muzzafar Abad	Manghopir	20.0	3
G-11	Mini Bus	Safooran Goth	Madina Colony	6.0	10

Public Transport Route	Vehicle Type	UC of Origin	UC of Destination	Headway [min]	Frequency [veh/h]
G-11	Mini Bus	Madina Colony	Safooran Goth	6.0	10
G-13	Mini Bus	Gulzar-e-Hijri	Gulshan-e-Ghazi	10.9	6
G-13	Mini Bus	Gulshan-e-Ghazi	Gulzar-e-Hijri	7.8	8
G-17	Mini Bus	Pehlwan Goth	Islam Nagar	6.0	10
G-17	Mini Bus	Islam Nagar	Pehlwan Goth	6.7	9
G-19	Mini Bus	Gulzar-e-Hijri	Manghopir	5.5	12
G-19	Mini Bus	Manghopir	Gulzar-e-Hijri	10.0	12
G-25	Mini Bus	Pehlwan Goth	Muslim Mujahid Colony	9.0	6
G-25	Mini Bus	Muslim Mujahid Colony	Pehlwan Goth	3.0	6
G-27	Mini Bus	Safooran Goth	Islam Nagar	5.0	8
G-27	Mini Bus	Islam Nagar	Safooran Goth	15.0	8
G-3	Mini Bus	Safooran Goth	Muslim Mujahid Colony	15.0	16
G-3	Mini Bus	Muslim Mujahid Colony	Safooran Goth	3.0	16
G-7	Mini Bus	Gulzar-e-Hijri	Gulshan-e-Ghazi	3.0	11
G-7	Mini Bus	Gulshan-e-Ghazi	Gulzar-e-Hijri	10.0	13
GreeN Metro	Coach	Landhi	Kiamari	15.0	5
GreeN Metro	Coach	Kiamari	Landhi	12.0	4
Gulistan Coach	Coach	Pehlwan Goth	Clifton Cantonment	17.0	7
Gulistan Coach	Coach	Clifton Cantonment	Pehlwan Goth	3.0	6
IllyaS coach	Coach	Sharafi Goth	Madina Colony	3.0	9
IllyaS coach	Coach	Madina Colony	Sharafi Goth	12.0	12
KL	Mini Bus	Garibabad	Nasir Colony	15.0	20
KL	Mini Bus	Nasir Colony	Garibabad	5.0	20
M-1	Mini Bus	Clifton Cantonment	Kiamari	5.0	10
M-1	Mini Bus	Kiamari	Clifton Cantonment	3.0	12
Marwat Coach	Coach	Islam Nagar	Clifton Cantonment	3.0	20
Marwat Coach	Coach	Clifton Cantonment	Islam Nagar	8.0	26
Mashriq Coach	Coach	Muzzafar Abad	Madina Colony	7.0	10
Mashriq Coach	Coach	Madina Colony	Muzzafar Abad	6.0	13
Masood Coach	Coach	Songal	Muzzafar Abad	5.0	8
Masood Coach	Coach	Muzzafar Abad	Songal	8.0	8
Muslim Coach	Coach	Landhi	Kiamari	10.0	15
Muslim Coach	Coach	Kiamari	Landhi	3.0	8
N	Mini Bus	Madina Colony	Clifton Cantonment	3.0	12
N	Mini Bus	Clifton Cantonment	Madina Colony	10.0	12
N-4	Mini Bus	Mohammad Nagar	Clifton Cantonment	5.0	10
N-4	Mini Bus	Clifton Cantonment	Mohammad Nagar	16.0	10
N-5	Mini Bus	Islam Nagar	Bilal Colony	15.0	15
N-5	Mini Bus	Bilal Colony	Islam Nagar	3.0	12
New Afridi Coach	Coach	Dauod Chowrangi	Gulshan-e-Ghazi	3.0	14

Public Transport Route	Vehicle Type	UC of Origin	UC of Destination	Headway [min]	Frequency [veh/h]
New Afridi Coach	Coach	Gulshan-e-Ghazi	Dauod Chowrangi	4.0	20
P-1	Mini Bus	Khokrapar	Maripur	4.0	2
P-1	Mini Bus	Maripur	Khokrapar	9.0	8
S-2	Mini Bus	Metroville Colony	Silver Town	12.0	7
S-2	Mini Bus	Silver Town	Metroville Colony	9.0	6
Safari Coach	Coach	Pehlwan Goth	Manghopir	20.0	5
Safari Coach	Coach	Manghopir	Pehlwan Goth	6.0	8
Shamma Coach	Coach	Shah N. B. Colony	Cattle Colony	6.0	8
Shamma Coach	Coach	Cattle Colony	Shah N. B. Colony	11.0	8
Sheraz Coach	Coach	Malir Cantonment	Maripur	8.0	12
Sheraz Coach	Coach	Maripur	Malir Cantonment	6.0	13
SL	Mini Bus	Moin Abad	Clifton Cantonment	7.0	8
SL	Mini Bus	Clifton Cantonment	Moin Abad	5.0	4
Star Line	Coach	Songal	Islam Nagar	5.0	4
Star Line	Coach	Islam Nagar	Songal	10.0	5
Super Hasan Zai Coach	Coach	Khehkeshan	Songal	10.0	9
Super Hasan Zai Coach	Coach	Songal	Khehkeshan	9.0	9
UTS-12	Mini Bus	Khokrapar	Kiamari	8.0	4
UTS-12	Mini Bus	Kiamari	Khokrapar	4.0	19
W-18	Mini Bus	Yusuf Goth	Dauod Chowrangi	4.0	4
W-18	Mini Bus	Dauod Chowrangi	Yusuf Goth	6.0	2
W-21	Mini Bus	Manghopir	Clifton Cantonment	5.0	13
W-21	Mini Bus	Clifton Cantonment	Manghopir	12.0	10
W-22	Mini Bus	Shah N. B. Colony	Silver Town	15.0	10
W-22	Mini Bus	Silver Town	Shah N. B. Colony	9.0	10
W-30	Mini Bus	Islamia Colony	Bilal Colony	11.0	8
W-30	Mini Bus	Bilal Colony	Islamia Colony	7.0	8
X-23	Mini Bus	Muzzafar Abad	Ittehad Town	5.0	9
X-23	Mini Bus	Ittehad Town	Muzzafar Abad	3.0	13
XB	Mini Bus	Nasir Colony	Haryana Colony	3.0	20
XB	Mini Bus	Haryana Colony	Nasir Colony	6.0	20
Z-2	Mini Bus	Gulshan-e-Ghazi	Bilal Colony	5.0	4
Z-2	Mini Bus	Bilal Colony	Gulshan-e-Ghazi	3.0	5

2.3 Travel Speed Survey

Travel speeds are the source to determine the travel time for each link. The travel times of each link are used as the in-vehicle travel time during the assignment procedure, as described in item **3.2**.

Three data sources were used to determine the speed of each segment. The first database, the public transportation speed, was obtained by the analysis of GPS observations in public transport routes. Two other databases were used in combination to obtain the speed regarding the private transportation, and they were obtained by GPS observation and by speed analysis based on information obtained from Google Maps. The segments with both public and private transportation speed information were analysed in order to generate speed conversion factors, making it possible to complete the remaining segments with information for both public and private modes. This process can be observed in Figure 8:

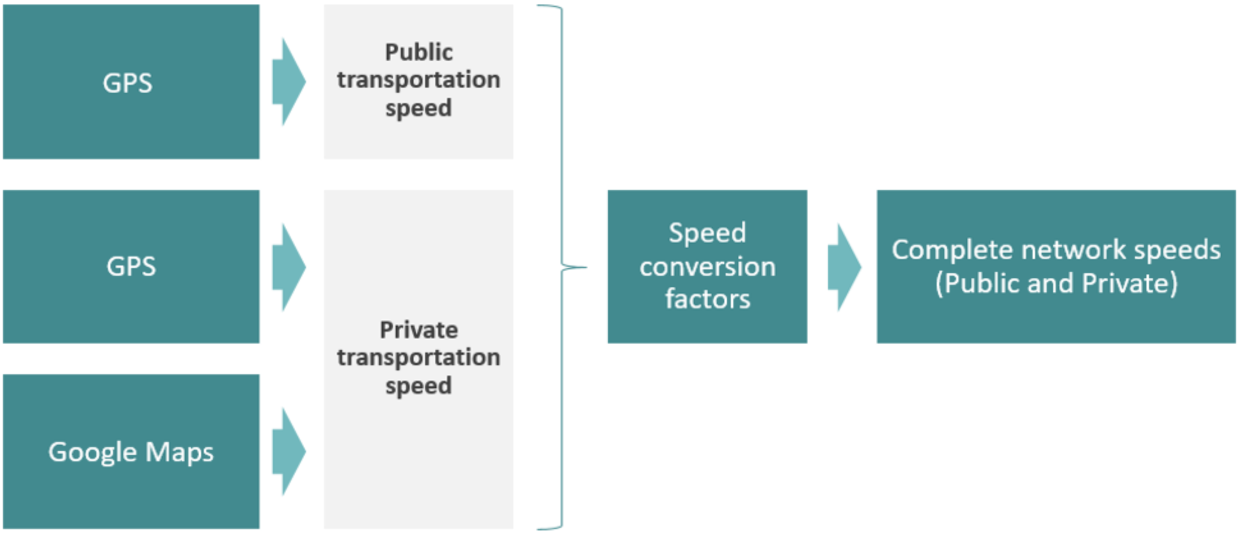
GPS
Public transportation speed
GPS
Google Maps
Private transportation speed
Speed conversion factors
Complete network speeds (Public and Private)

Figure 8: Travel speed derivation process

These speed conversion factors were used to obtain speed information for segments without public speed information, considering three speed ranges (<10, 10-20 and >20 km/h). In Karachi, public transportation speeds are lower than private transportation speeds, therefore the conversion factors from private to public speeds are reduction factors, as presented in Table 6:

Table 6: Conversion factors from private to public speeds

Speed range (km/h)	Conversion factor (% of reduction)
< 10	-
10 - 20	15%
> 20	20%

Finally, two databases were created with complete information regarding public and private travel speed, as shown in Figure 9 and Figure 10 below:

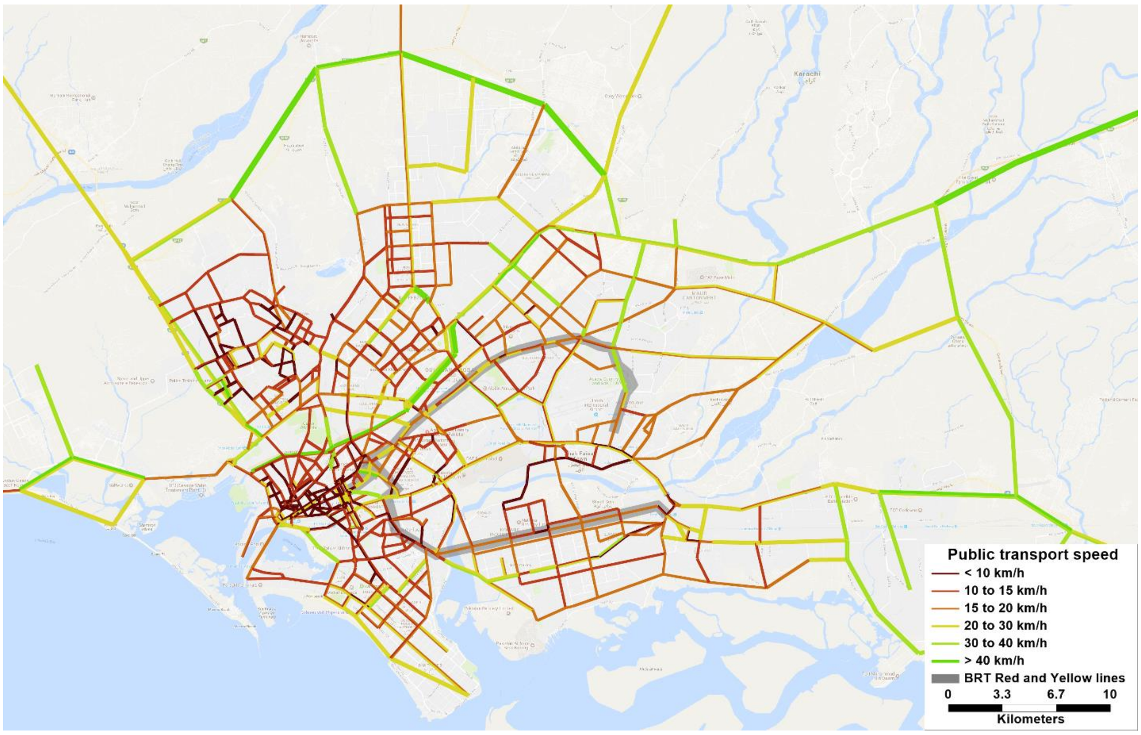

Figure 9: Public transportation average speed in Karachi

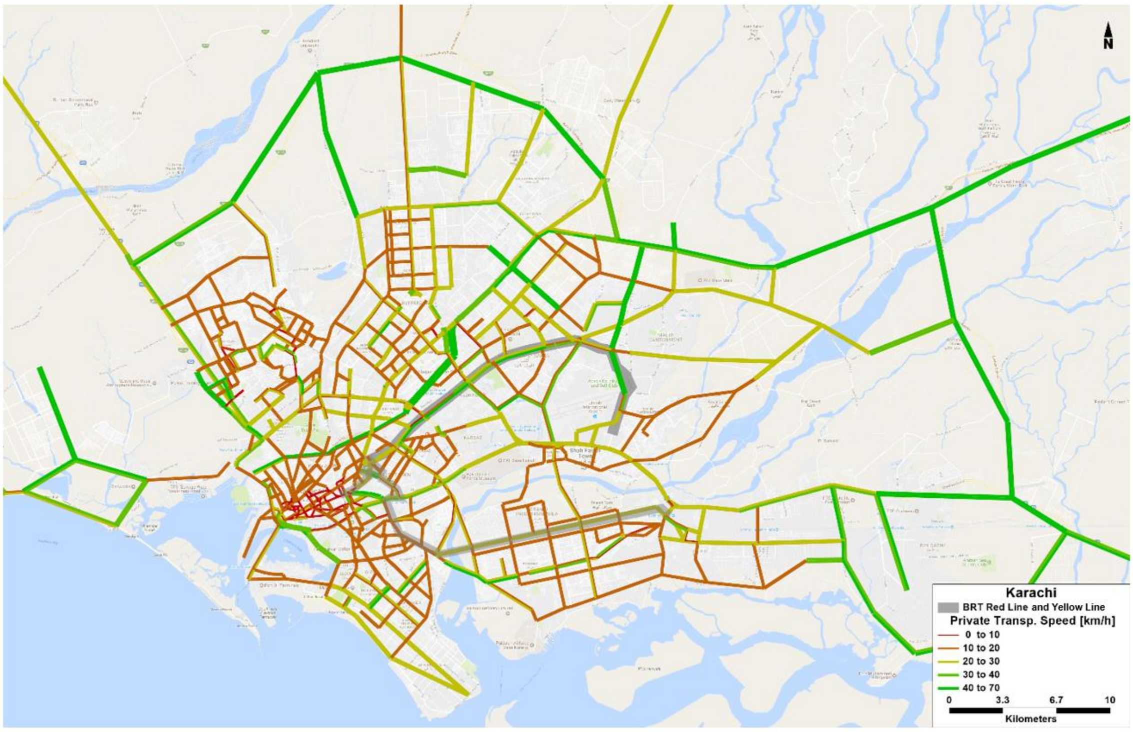

Figure 10: Private transportation average speed in Karachi

The following images detail some critical areas in regions near the Red and Yellow BRT corridors, as well as at the city center, regarding the public transport speed in the network. Figure 11 shows details of Korangi Industrial Area and of Defence Mor regions, both near Yellow Line alignment.

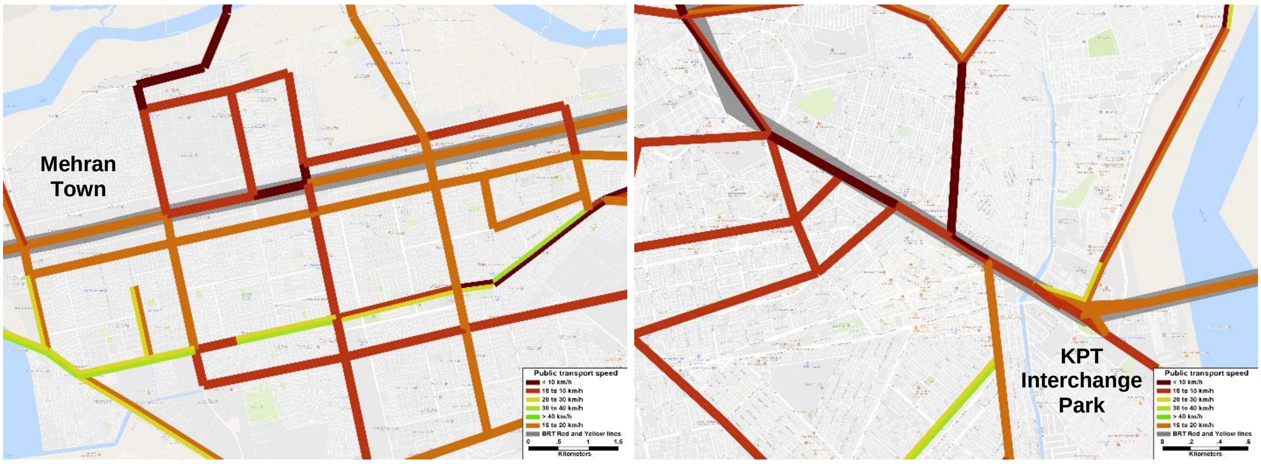

Figure 11: Public transp. speed in Korangi Ind. Area (left) and Defence Mor (right)

The figures show that in Korangi area there is an unsatisfactory service level, as the system presents low speeds, especially around Korangi Road, where speeds below 10 km/h can be observed. The area near Defence Mor is another critical point, as the convergence of several routes cause great congestion and therefore several links present very low speeds.

The following images show in detail some relevant regions around the Red Line alignment.

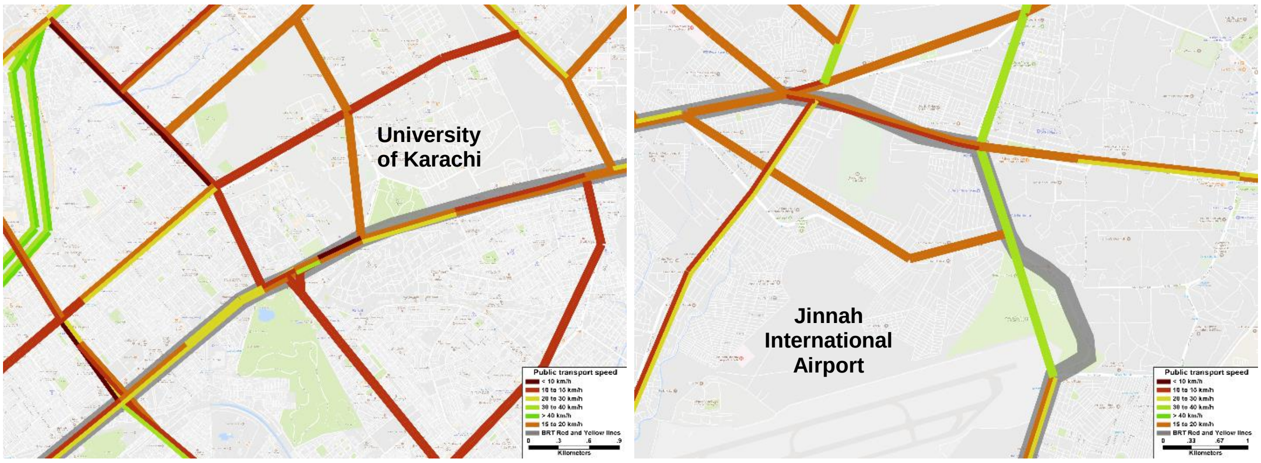

Figure 12: Public transp. speed near University of Karachi (left) and Jinnah Airport (right)

It can be observed that the areas near the University present low speeds on average, partially due to activities related the institution, which produces several trips from and to the area. Another observed characteristic is that less densely occupied areas near the airport, such as the surroundings of Malir Link to Super Hwy, present higher average speeds, from 30 km/h to 40km/h.

The next figure shows in detail the central area of the city.

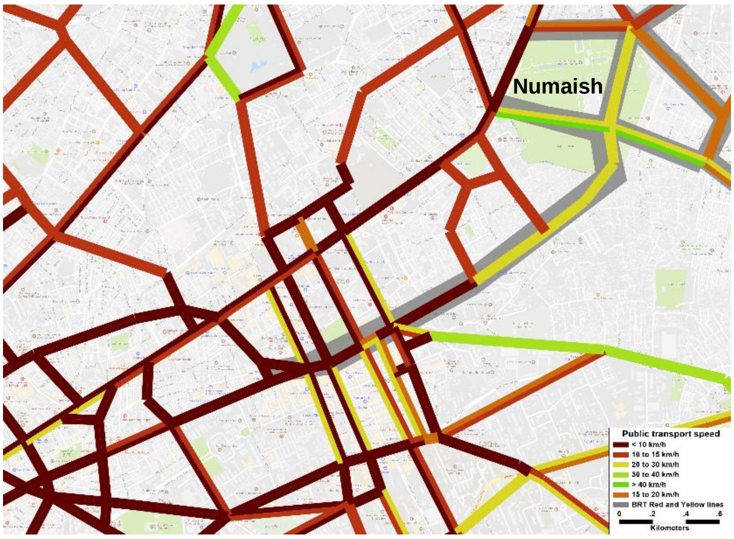

Figure 13: Public transport speed near the city centre

Figure 13 shows that the central region, near Numaish and along M.A. Jinnah Road, is a very critical area, with most of its links presenting speeds lower than 10 km/h.

3. Transport modelling

The transport planning relies on the availability of a comprehensive and realistic method of depicting the existing conditions regarding passenger demand values, travel times, corridor loads, vehicle fleet and many other factors. Demand forecasting models can provide an approximate simulation of the reality of a transportation system. This simulation is the combination of the city's road network, its public transportation lines and routes and the existing trip distribution between production and attraction regions. The validity of the model is verified and later adjusted by comparing observed traffic counts with simulated volumes.

This task involves transportation modelling, with particular emphasis on public transport, to estimate the passenger demand for a future BRT system. This modelling and demand analysis will form the basis for completing other tasks including the operational planning, routes definition and system conception. Other modelling outputs such as number of passengers, number of vehicles, travel time and vehicle kilometres are used in the financial and economic feasibility studies for all the alternatives.

3.1 Transportation network

Models are a simplified representation of real world systems that allow projections of future conditions. Transportation modelling is quite commonly used to forecast the demand and estimate the necessary supply conditions, information that subsidizes decisions on future infrastructure needs and policy measures to be adopted.

Designing a transportation system involving road infrastructure and a bus operational plan requires a detailed and accurate geographic base. From the official data and the results of transport surveys, it was possible to build a transport model, with capacity to generate all outputs needed for this project.

The following paragraphs describe the transport modelling performed for Karachi.

3.1.1 Zoning

First, it is important to conceptualize that a transport analysis zone is an abstract area, represented in the network by a centroid node. The zone represents a region with homogenous characteristics in relation to transportation demand and services accessibility to public and private transportation, mainly due to transportation facilities and physical barriers. The centroids nodes are connected to the network by virtual links called connectors. Zoning is a resource used for both supply and demand modelling.

A larger or smaller aggregation depends on the necessary precision to adequately represent the important transport system interactions and obtain results with the desirable quality for each part of the study area. Usually, the central area has smaller zones and the peripheral region has larger zones, due to differences in the availability of information and in the connectivity of such regions.

The first version of the zoning was composed by 187 zones, as shown in Figure 14 below.

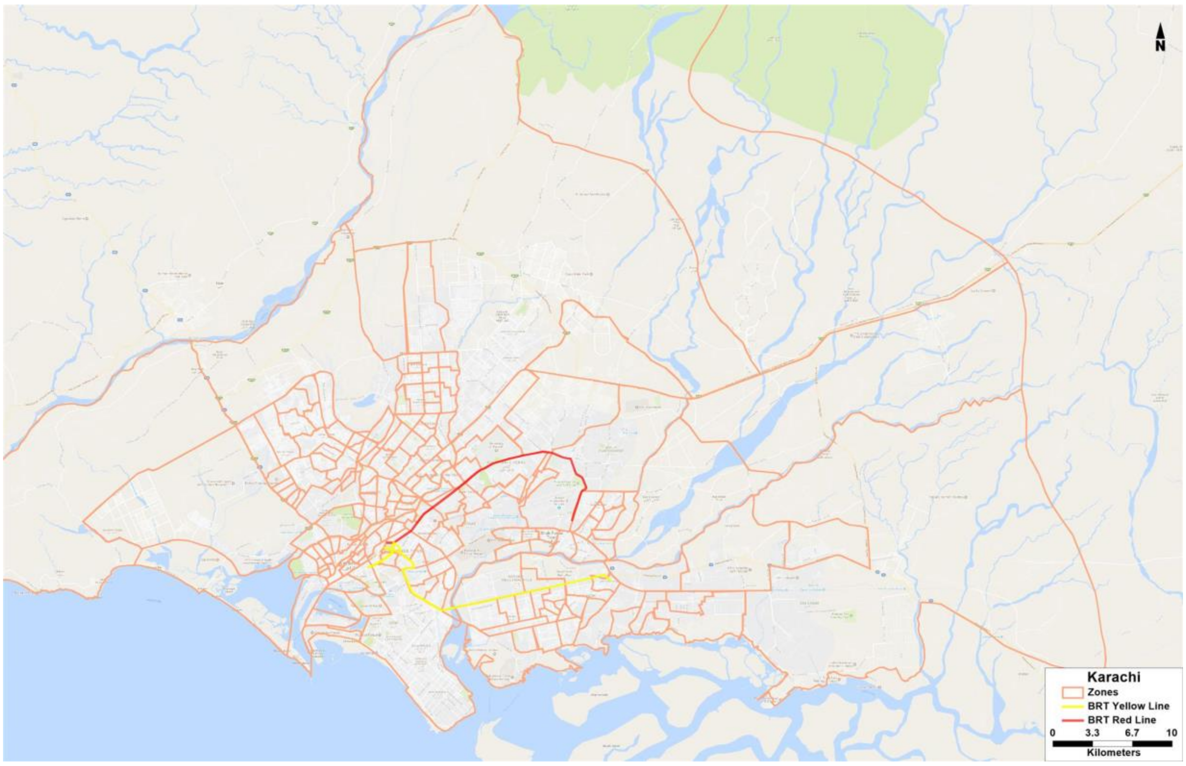

Figure 14: Original zoning shape file from JICA

In order to improve the reliability of the zoning, the areas near the possible locations of the BRT Yellow and Red line were further detailed and segregated, as shown in Figure 15.

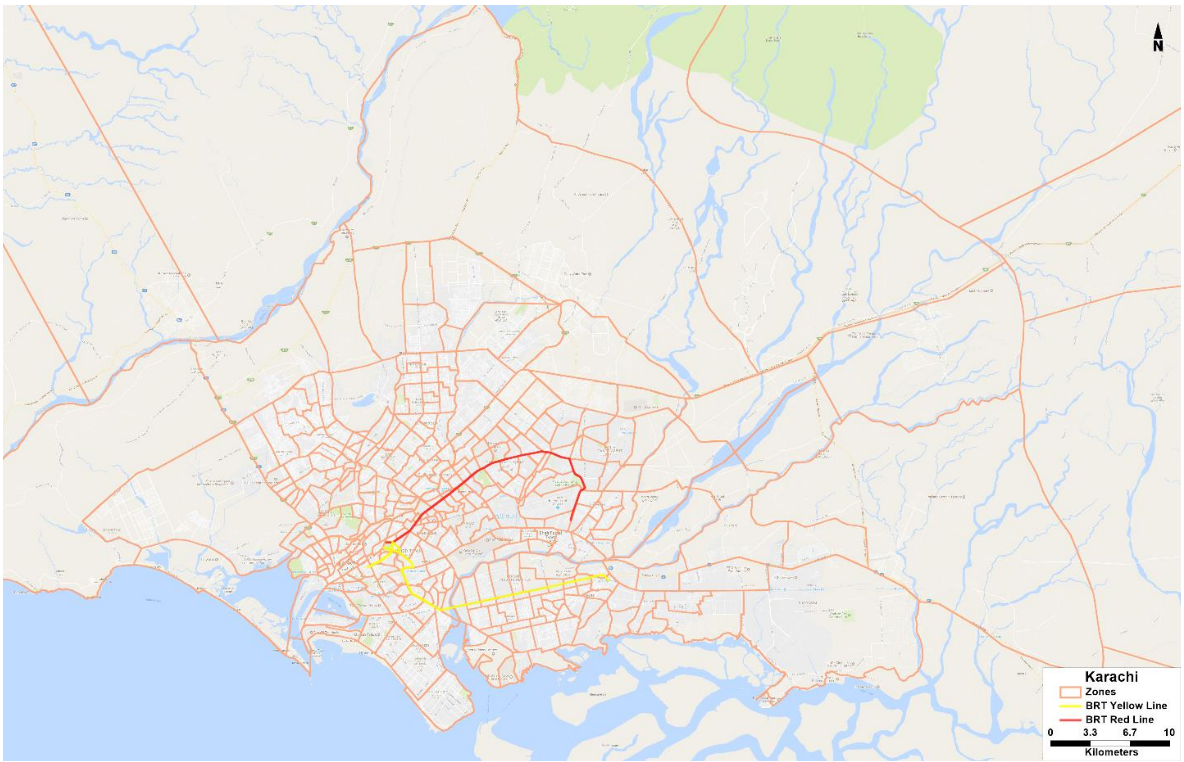

Figure 15: New detailed zoning

The new zoning considered for this transport demand modelling contains 342 zones, which are more detailed in the areas near the Red and Yellow Line alignments and at the Saddar area of the city.

3.1.2 Road network

The geographic base was updated to match the current conditions of the road network in order for it to meet the precision and refinement required for appropriately structuring the demand-forecasting model in the modelling software EMME (version 4.3.5). Therefore, the road network was updated and corrected based on the geographic base obtained from KTIP (Karachi Transport Improvement Project) dataset. The main characteristics, like number of lanes per road, road condition, hierarchy, etc., were added from the road network inventory survey and from other complementary traffic surveys.

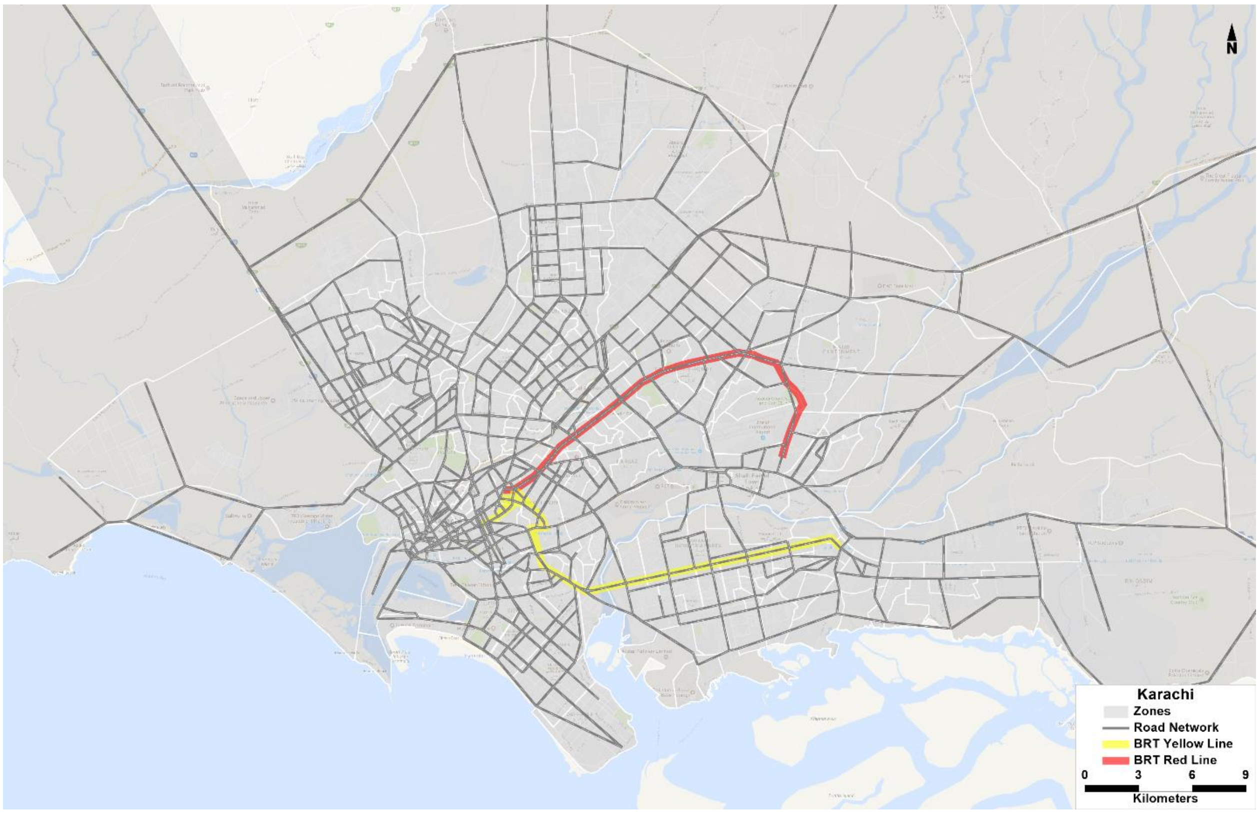

Figure 16: Road Network System and Zoning for Karachi

The road network prepared for the simulation model contains:

- 3,712 links representing roads and 816 virtual links representing centroid connections, mode transfers, etc.;
- 342 centroid nodes representing the different transport zones considered in the model;
- 1,125 regular nodes representing mainly road intersections.

The following map presents the centroids and connectors of the traffic network.

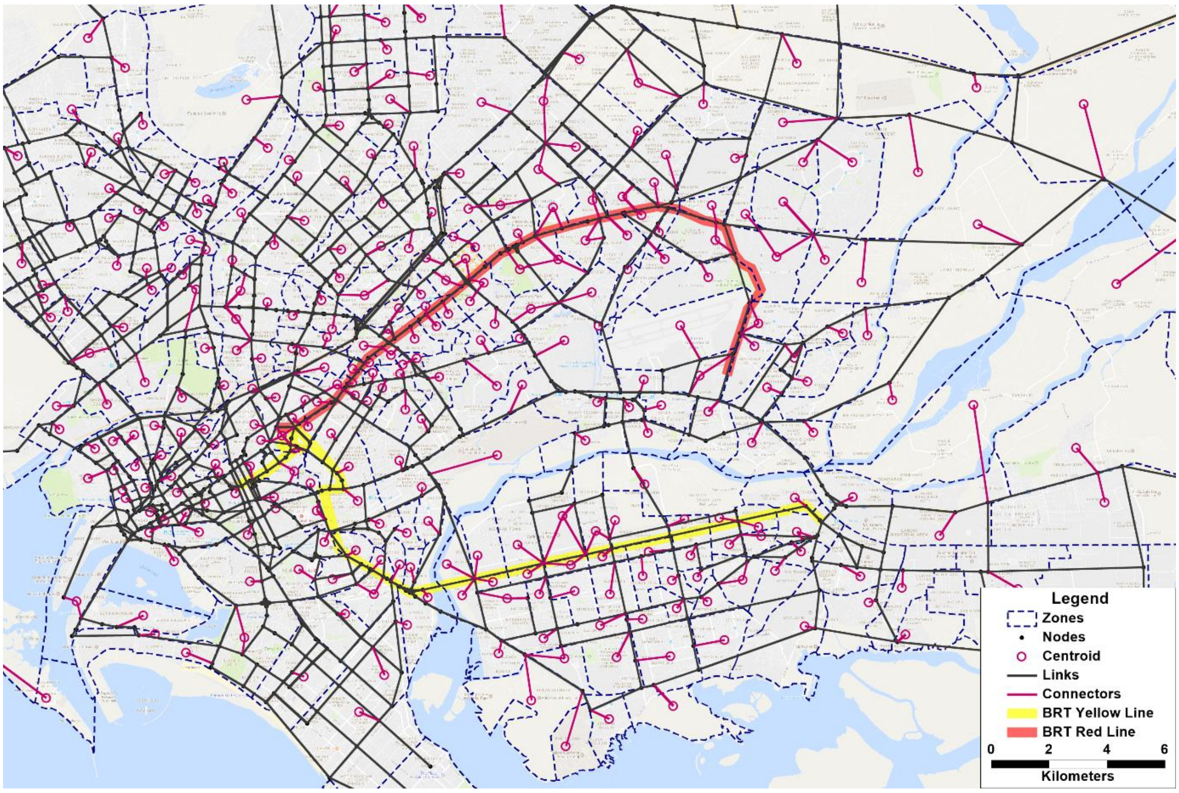

Figure 17: Centroids and zoning of Karachi

The following figure shows an example of the correspondence between the zones, the connectors and the road network of the transport model in detail.

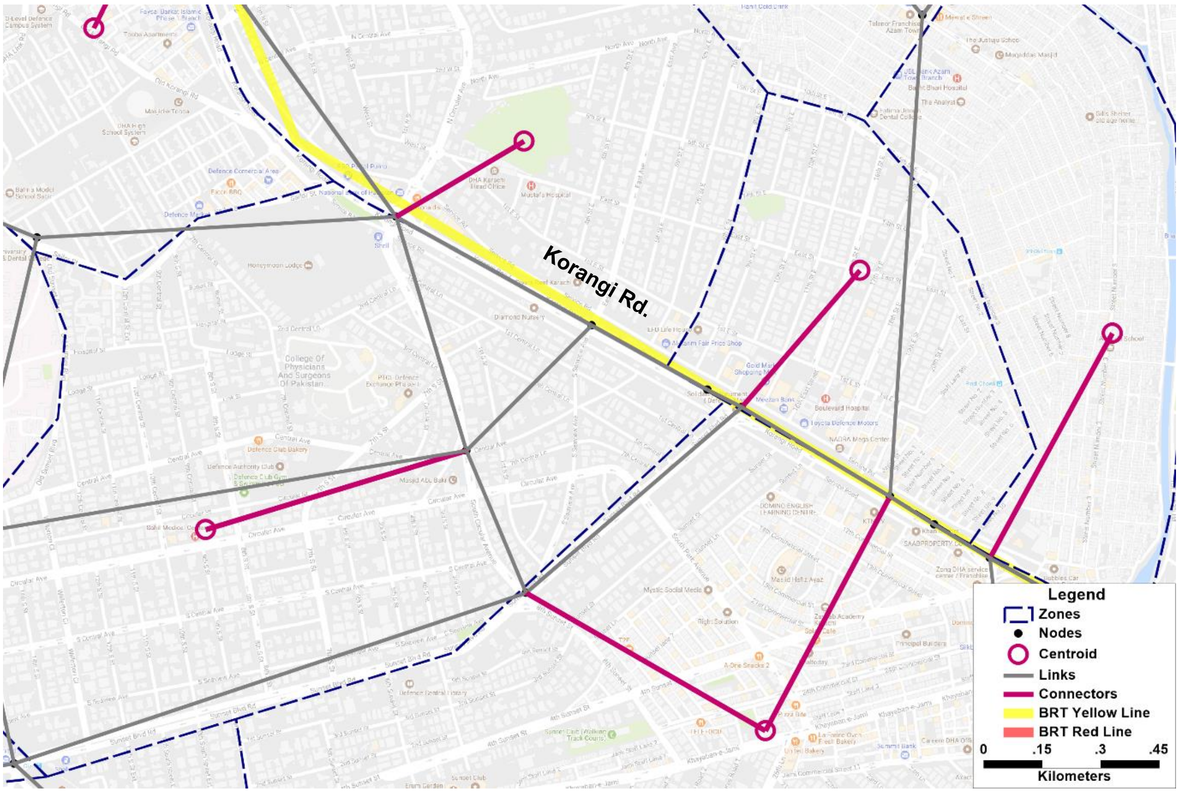

Figure 18: Centroids and zoning detail

The previous figure shows in detail how the connectors connect the zone's centroids with the rest of the network, and how the zones are related to its corresponding centroids.

A fundamental feature of the physical road network representation is the definition of the operational typology. This typology consists of the definition of groups of roads of similar and at least comparable geometric and operational characteristics and which, therefore, have similar patterns of behaviour in the network. The typology follows the hierarchy of the city and serves to standardize the network.

The typologies were created based on the hierarchy type that already existed on the base network. Each typology has its own operational characteristics. Table 7 below shows the typologies used.

Table 7: Road typology

Type	Description
1	Highway
20	Main
30	Arterial
40	Collector
50	Local
99	Connector

The following figure shows the typology adopted for the links of the network.

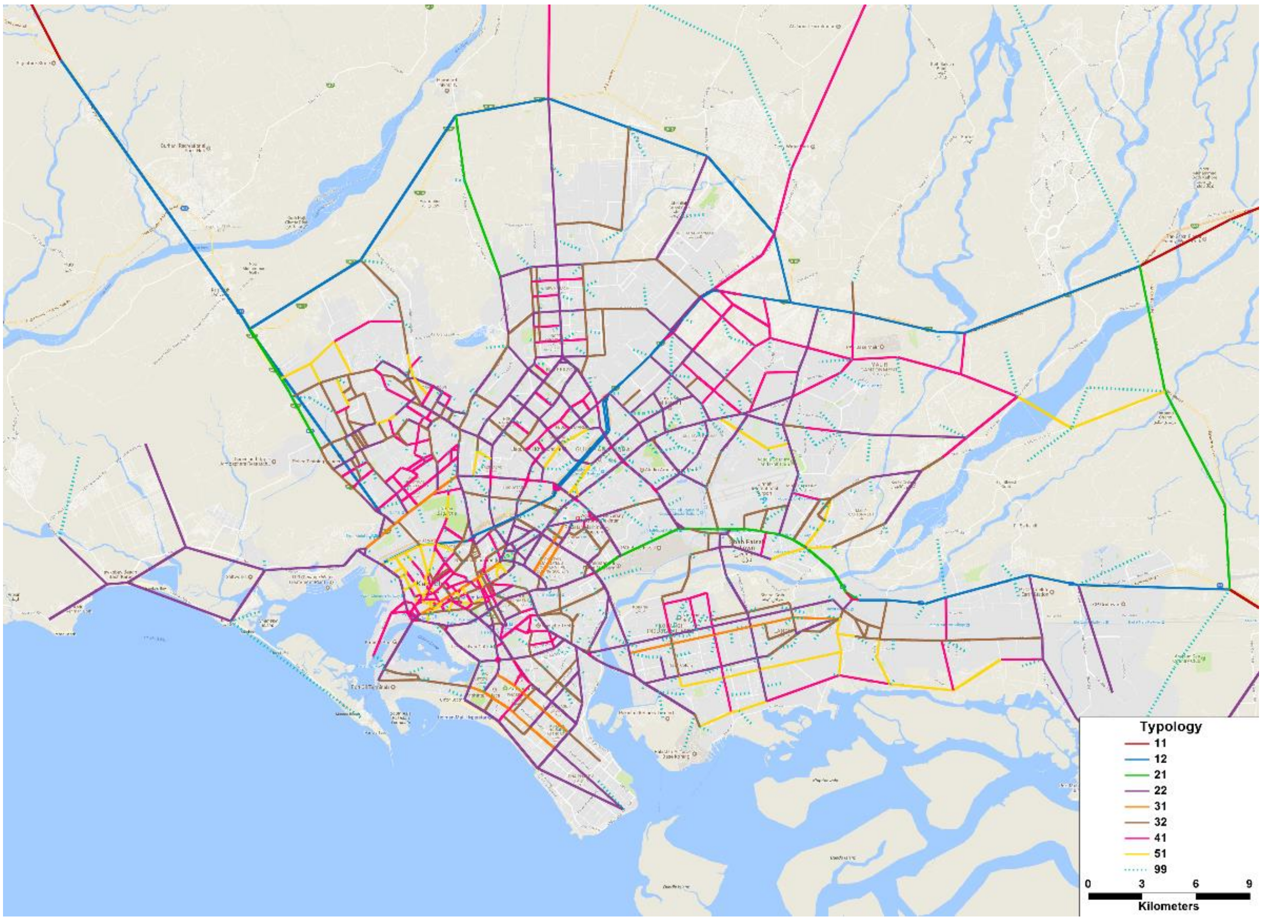

Figure 19: Road typology

3.1.3 Public transportation network

Based on the existing bus route mapping, the current public transportation system network was included in the model, represented by 57 public transport routes services, with two directions each. The itineraries were drawn and adjusted on top of the road network previously defined, and Figure 20 illustrates the network coverage of the public transport routes.

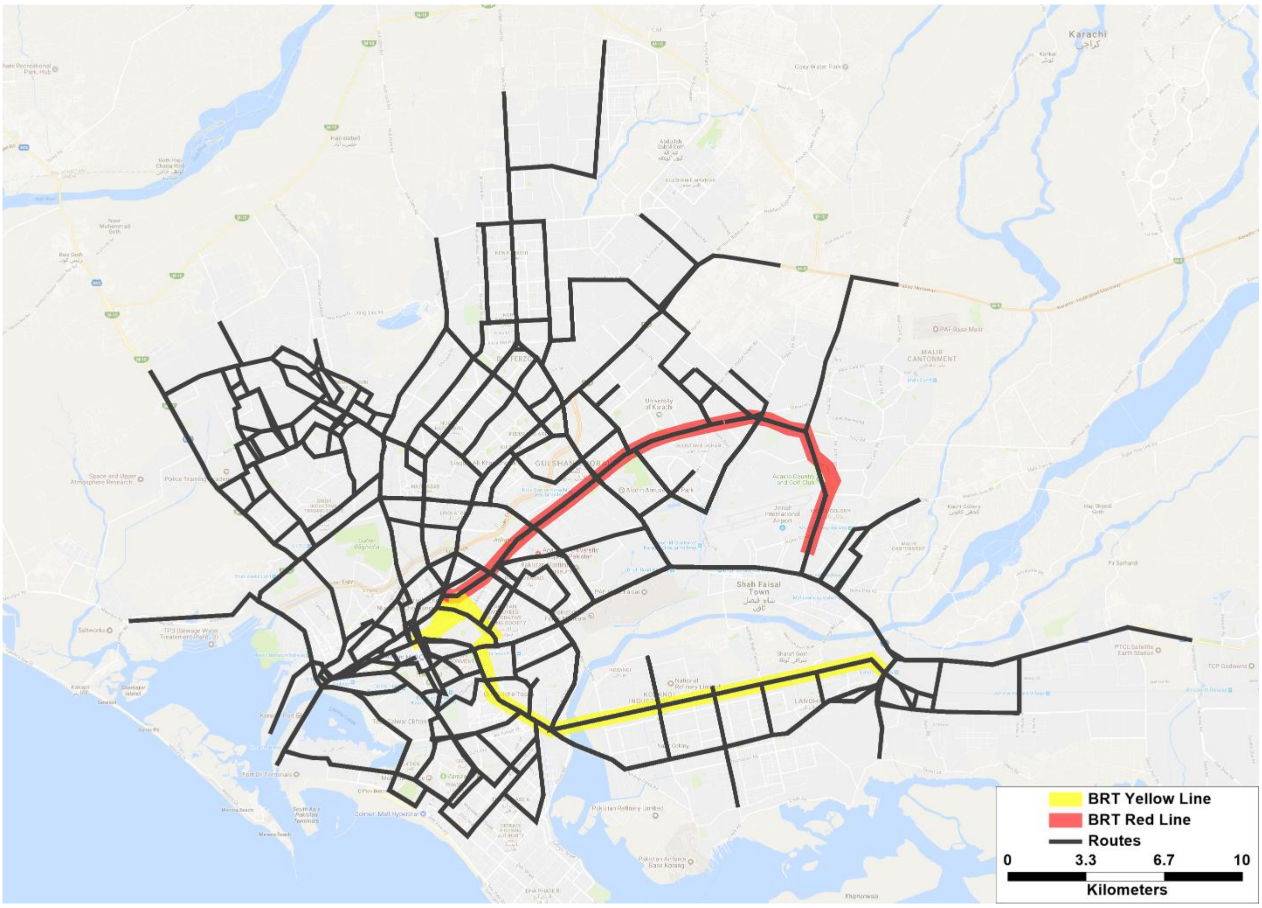

Figure 20: Karachi Public Transport Routes with influence on the BRT alignments

The routes information such as frequency, capacity and stops was based on the complementary traffic surveys, as presented in item 2 **– Complementary Traffic Surveys.**

Table 5 (Item **2.2** – Transport Frequency and Visual Occupancy Survey) presents a list with all public transportation routes and the respective headways considered in the transport model.

In Karachi, the public transportation routes are composed of three different types of vehicles: Coaches, Mini Buses and Large Buses. The Coaches and the Mini Buses are very similar and present the same capacity (Figure 21).

Figure 21: Coaches and Mini Buses

The following images illustrate all public transport routes that are served by coaches and by mini buses.

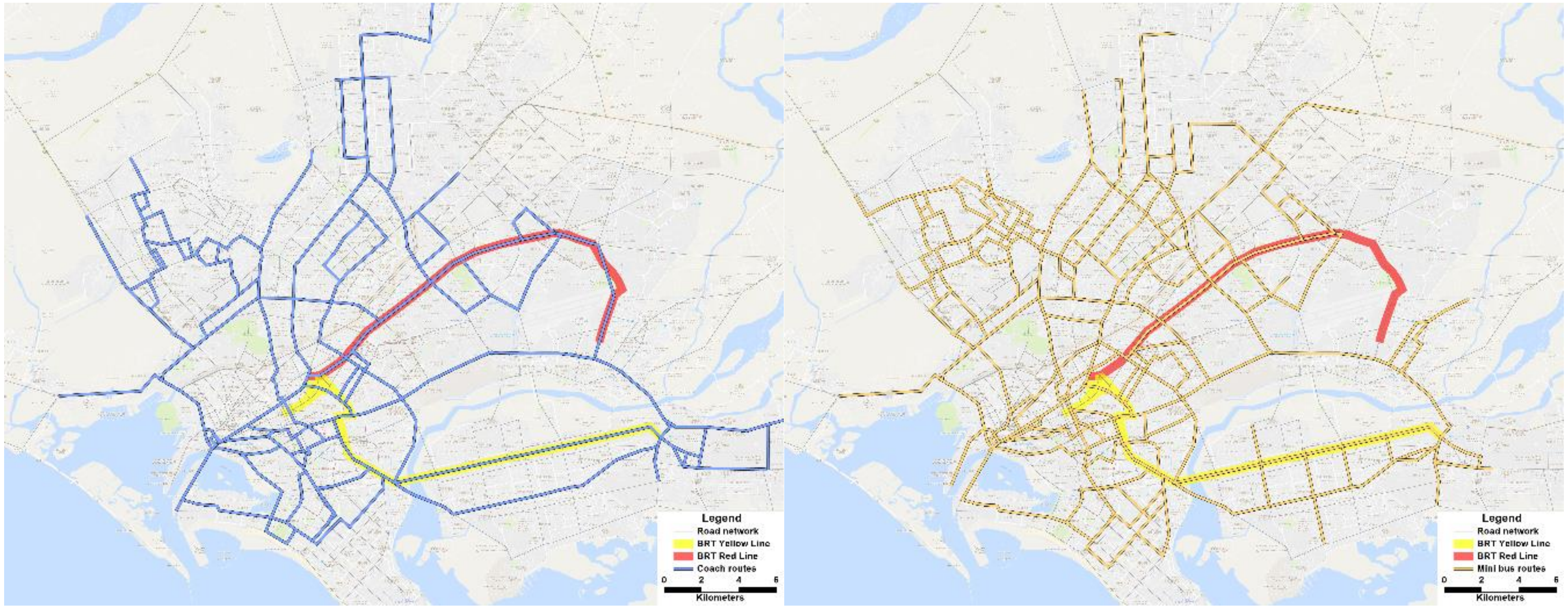

Figure 22: Coach (left) and Mini bus (right) routes

Large Buses (Figure 23) are larger than Coaches and Mini Buses and present a higher capacity.

Figure 23: Large BusesThe following image presents all routes that are served by large buses

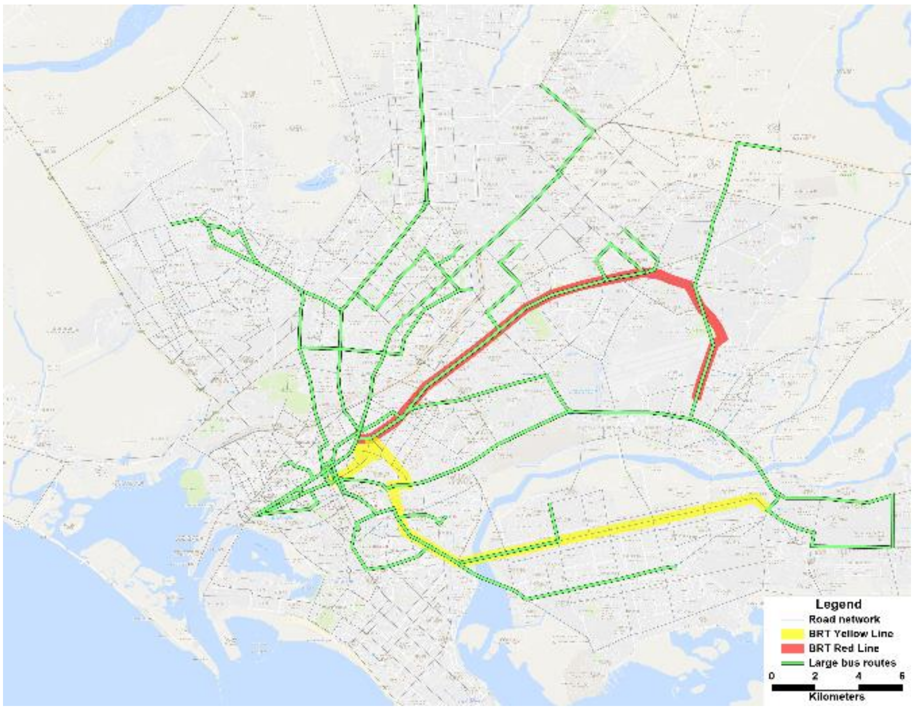

Figure 24: Large bus routes

Table 8 presents the capacity of the three vehicle types, segregated between sitting and standing.

Table 8: Public transport vehicles capacity

Vehicle Type	Capacity		
	Full Sitting	Standing	Total
Coaches	26	15	41
Mini Buses	26	15	41
Large Buses	32	22	54

The figures below show the characteristics of the public transport routes in terms of length and frequency.

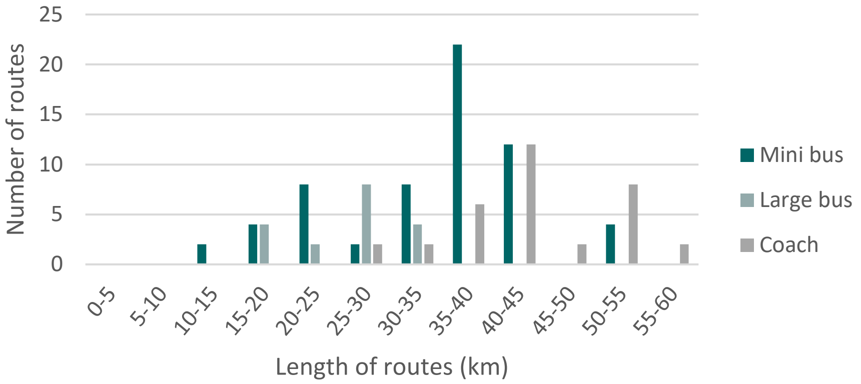

Figure 25: Distribution of routes length

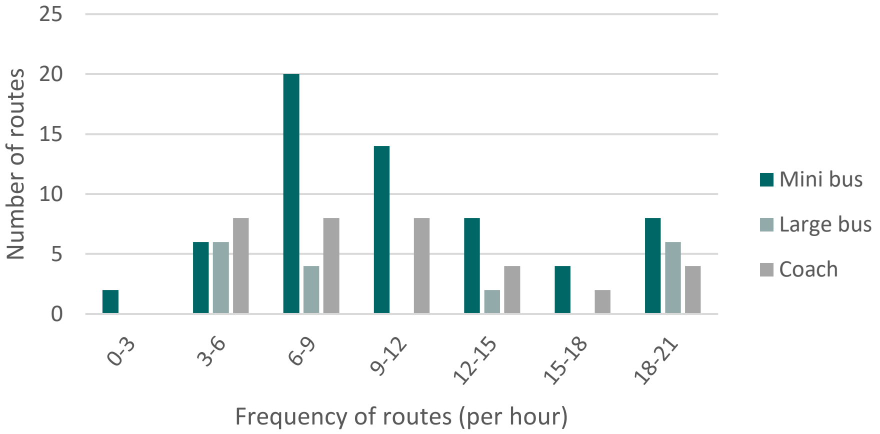

Figure 26: Distribution of routes frequency

The average distance of the surveyed routes is approximately 40 km, a relatively high value. The coach routes present the greatest average length, with about 45 km, while the long buses present an average of 35 km.

The average frequency by route in the peak hour is approximately 12 departures per hour, equivalent to 5 minutes of headway. As expected, the minibuses and coaches present a greater regularity with about 15 departures per hour.

All of the three vehicle types run under the same fare structure, which is the distance based structure shown in the Figure 27.

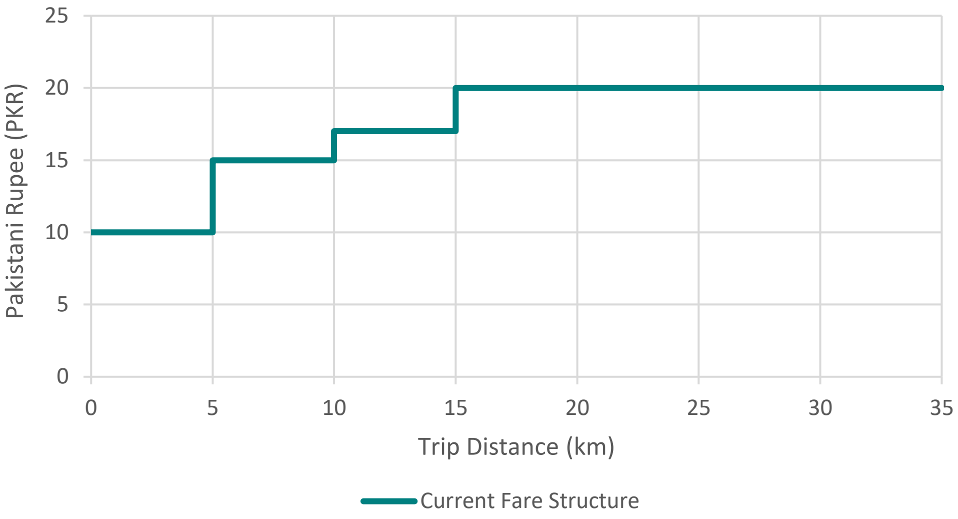

Figure 27: Public transport current fare structure

As seen in the previous image, current fares vary from PKR 10 to PKR 20, price increments are applied every 5 km and trips longer than 15 km do not present further increases on the fare.

3.2 Transport Demand Methodology

The objective of the transport modelling for the Karachi BRT is to predict the transport system behaviour on specific influence areas, focused on specific corridors. For this purpose, the transport model relies on operational surveys, that is, surveys that demonstrate the current utilization of the transport system.

To develop the transport model, one of the tools to be analysed is the origin-destination matrix, which is the representation of the trips being made in the study area during the assignment period. In the assignment matrix, each cell represents an origin destination pair. Each of these cells contains the number of trips from the origin zone to the destination zone during the assignment period.

There are two groups of matrices, one for transit (public transport) and another for private modes (passenger car, Rickshaws and motorcycles), which compose the potential demand for the BRT system.

The general transport modelling process is schematized in Figure 28 below.

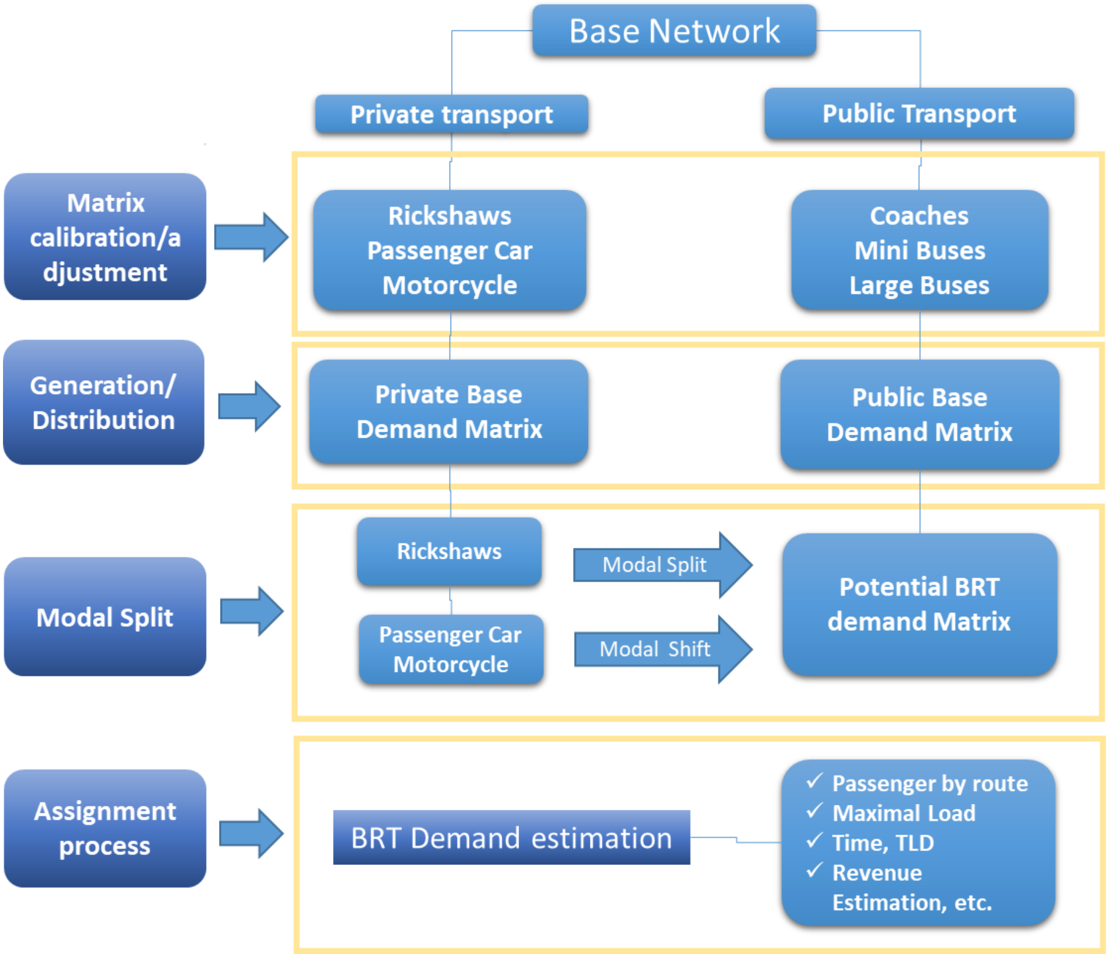

Figure 28: Transport modelling process[1]

This process includes the phases of preparation both road network and public transport network – which forms the supply model itself – and then processing all the matrices for public and private transport. On the one hand, Rickshaws matrices were obtained from surveyed information and JICA OD matrices. On the other hand, passenger car and motorcycles modes matrices were based on the respective matrices of JICA.

These matrices are subjected to a calibration process that considers the adjustment of the matrices to the observed flows of each demand segments.

The calibrated base matrices provide the information for the stages of generation, distribution and modal split, which aim to estimate the BRT potential demand matrix. This potential demand matrix is composed by the current public transport trips and the trips of private transport that migrate to the BRT system.

This potential BRT demand matrix is used in the assignment process of the scenarios with BRT system. The results are the passenger by route, maximal load, traveling time, trip length distribution, revenue, etc.

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[1] The modal split refers to a proper modal division, applied to a total number of trips, which results in the percentages of trips in BRT and in Rickshaw. In the case of motorcycles and passenger cars, modal split procedure refers to a migration of this modes to the BRT system.

3.2.1 Trip generation and distribution

The total of trips produced and attracted at each zone is adjusted by a generation rate, calculated based on population, densification potential and the identification of homogeneous zones[2].

Each zone was classified within the following categories, as each region is likely to have a different population growth variation along the next years:

- Region 0: Presents population growth for a long period due to its great potential of occupation;
- Region 1: Presents intermediary population growth due to its partially consolidated structure;
- Region 2: Represents the most consolidated region of the city, reaching growth maturity in a shorter period.

The criteria for this classification was based on the occupation density (for example, very dense areas are near their saturation points, and are not likely to keep growing for a long time), which was based on three density ranges. Figure 54 shows how the occupation density was estimated.

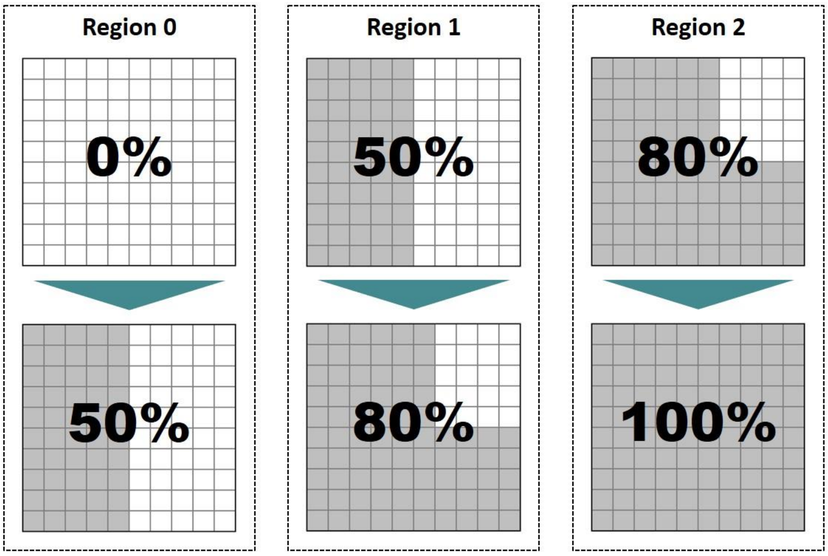

Figure 29: Population density ranges for occupancy classification

Zones with homogeneous characteristics are determined from this categorization, forming macrozones (Figure 30), in which it is assumed that the generation rate is similar. This rate is calculated as the ratio between the number of observed trips and the inhabitants of the macrozone.

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[2] The estimation of densification potential is presented on further detailed on item 4.

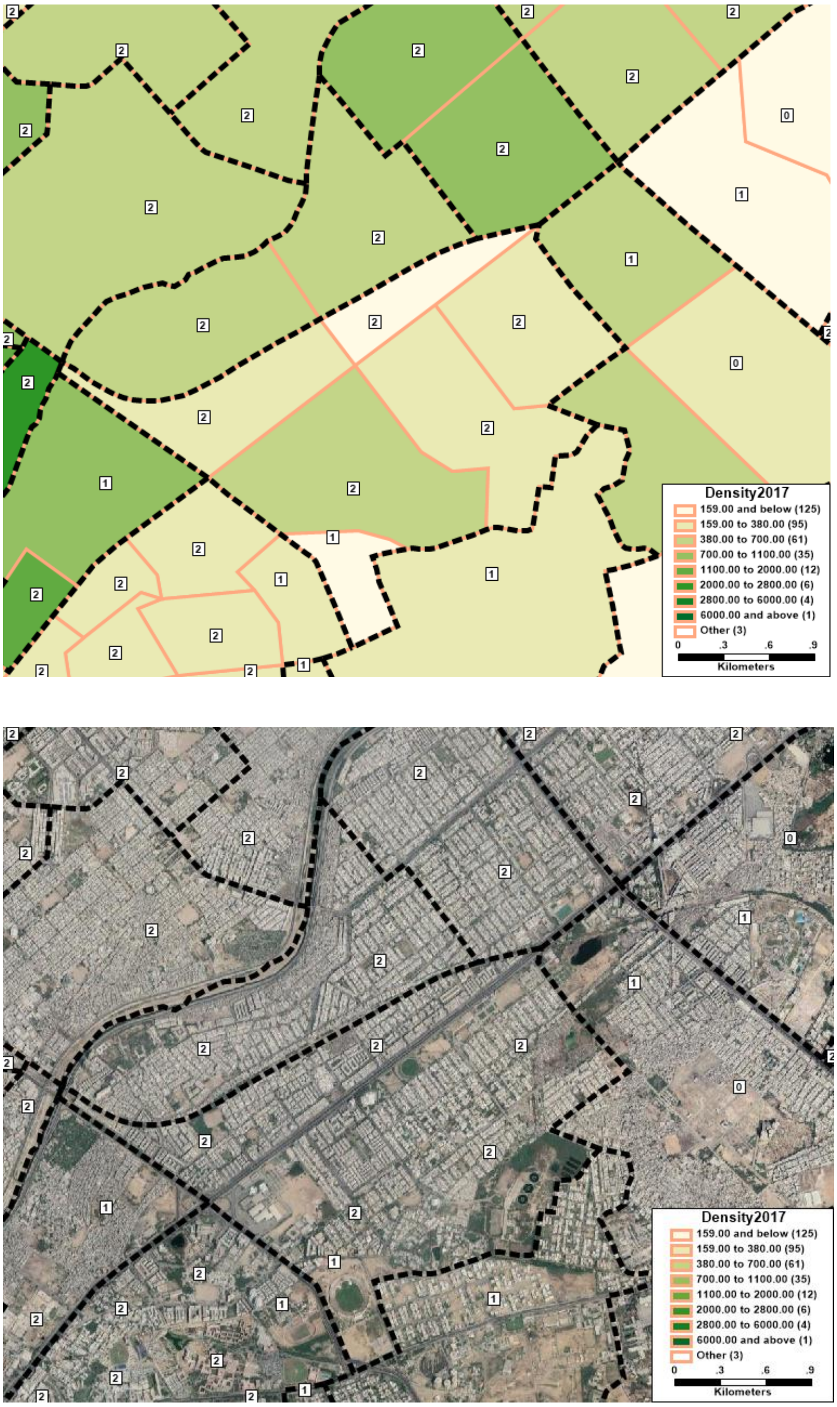

Figure 30: Population density ranges for occupancy classification and macrozones

The trip generation, previously analysed, allows determining, in general, one of the extreme points of the origin/destination trips. The sub-step called travel distribution defines trips as a whole, filling the inner cells of the matrix.

Therefore, the purpose of this stage – trips distribution – is to develop a procedure that synthesizes the connections between traffic zones, for individuals captive to public transport, as well as individuals who have a choice between transport modes.

For private modes (Rickshaw, passenger car and motorcycle) it is proposed the implementation of an indirect model, based on factors of variation (F). In this category of models, the increase or decrease on the generation of trips (production and attraction) of the area of study is determined by F variation factors whose form is:

$$F = \frac{\text{Nº of Future trips}}{\text{Nº of current trips}}$$

The type of indirect model used is the Fratar Model, which has been one of the most useful iterative models in tactical and operational studies.

Engineer Thomas Fratar elaborated his model based on the modification of the number of trips between pairs of zones, adding the exchange that occurs with all other zones of a study area. Therefore, the projections and interzonal trips can be obtained by successive approximation iterative processes.

The Fratar model has as expression:

$$T_{i-j} = \frac{\mathrm{t}_{i-j} * \ \mathrm{F}_i . \mathrm{F}_j \ * \ \mathrm{Gi}}{\sum (\mathrm{F}_{i-j} * \mathrm{k}_{i-j} * \ \mathrm{t}_{i-j})}$$

Where:

T_{i-j} = number of future trips between i and j;

t_{i-j} = number of current trips between i and j;

F_i = factor of variation of zone i;

F_j = factor variation factor of zone j;

F_{i-j} = factor variation factor of zones i and j;

Gi = current generation of trips in i;

k_{i-j} = adjust factor for i-j OD pair for each iteration.

For public transport modes distribution stage (Coaches, minibuses and large buses) it is used a gravity model. The gravity model was originally motivated by the observation that flows decrease as a function of the distance separating zones, just as the gravitational pull between two objects decreases as the distance between the objects decreases as well. As implemented for planning models, the Newtonian analogy has been replaced with the hypothesis that the trips between zones i and j are a function of trips originating in zone i and the relative attractiveness and/or accessibility of zone j with respect to all zones.

The gravity model is the most widely used trip distribution model. This model explicitly relates flows between zones to interzonal impedance to travel. The assumption behind the gravity model is that the number of trips produced by zone i and attracted to zone j is proportional to:

- The number of trips produced by zone i;
- The number of trips attracted to zone j;

- A function (often called the impedance function) of the relative spatial separation or impedance between the zones.

The functional form of the gravity model is as follows:

$$T_{ij} = P_i \frac{A_j f(d_{ij})}{\sum A_z f(d_{iz})}$$

(constrained to productions)

$$T_{ij} = A_i \frac{P_j f(d_{ij})}{\sum P_z f(d_{iz})}$$

(constrained to attractions)

Where:

T_{ij} = The forecast flow producted by zone i and attracted to zone j;

P_j = The forecast number of trips producted by zone I;

A_j = The forecast number of trips atrated to zone I;

d_{ij} = The distance between zone i and zone j, used in Karachi’s model for impedance ;

$f(d_{ij})$ = The impedance function between zone i and zone j.

Many different measures of impedance can be used, such as travel distance, travel time, or travel cost. For Karachi model it is being used travel distance.

There are also several potential impedance functions to use to derive the relative attractiveness of each zone from the impedance. For the case of Karachi it is used an inverse power functions. The functional form is as follows:

$$f(d_{ij}) = d_{ij}^{-b}$$

Where:

$f(d_{ij})$ = The impedance function between zone i and zone j;

d_{ij} = The distance between zone i and zone j, used in Karachi’s model for impedance;

b = calibration factor, b>0

Prior to applying a gravity model, one has to calibrate the impedance function or friction factors. Calibration of aggregate trip distribution models entails estimation of the model parameters, including one or more impedance function coefficients. Calibration typically entails an iterative process that computes coefficients such that the gravity model replicates the trip length frequency distribution and matches base year productions and/ or attractions.

As calibrating the gravity model consists of estimating the parameters of the impedance function so that the gravity model reproduces, as closely as possible, the base year productions and/or attractions and the base year trip length distribution, the calibration producer requires the following inputs:

- A base year O-D matrix (observed public transport matrix);
- An impedance matrix (travel distance);
- A zone layer.

In the case of an inverse power function calibration, a single parameter is estimated such that the results of a gravity model using the functions f(d_{ij})= d_$_{ij}^{-b}$, respectively, approximate the Observed Trip Length Distribution, OTLD.

The calibrated function is shown below:

$$f(d_{ij}) = d_{ij}^{-7892}$$

The following figure shows the observed TLD and that obtained through the application of the distribution model. In general, an acceptable level of correspondence between the two histograms can be observed.

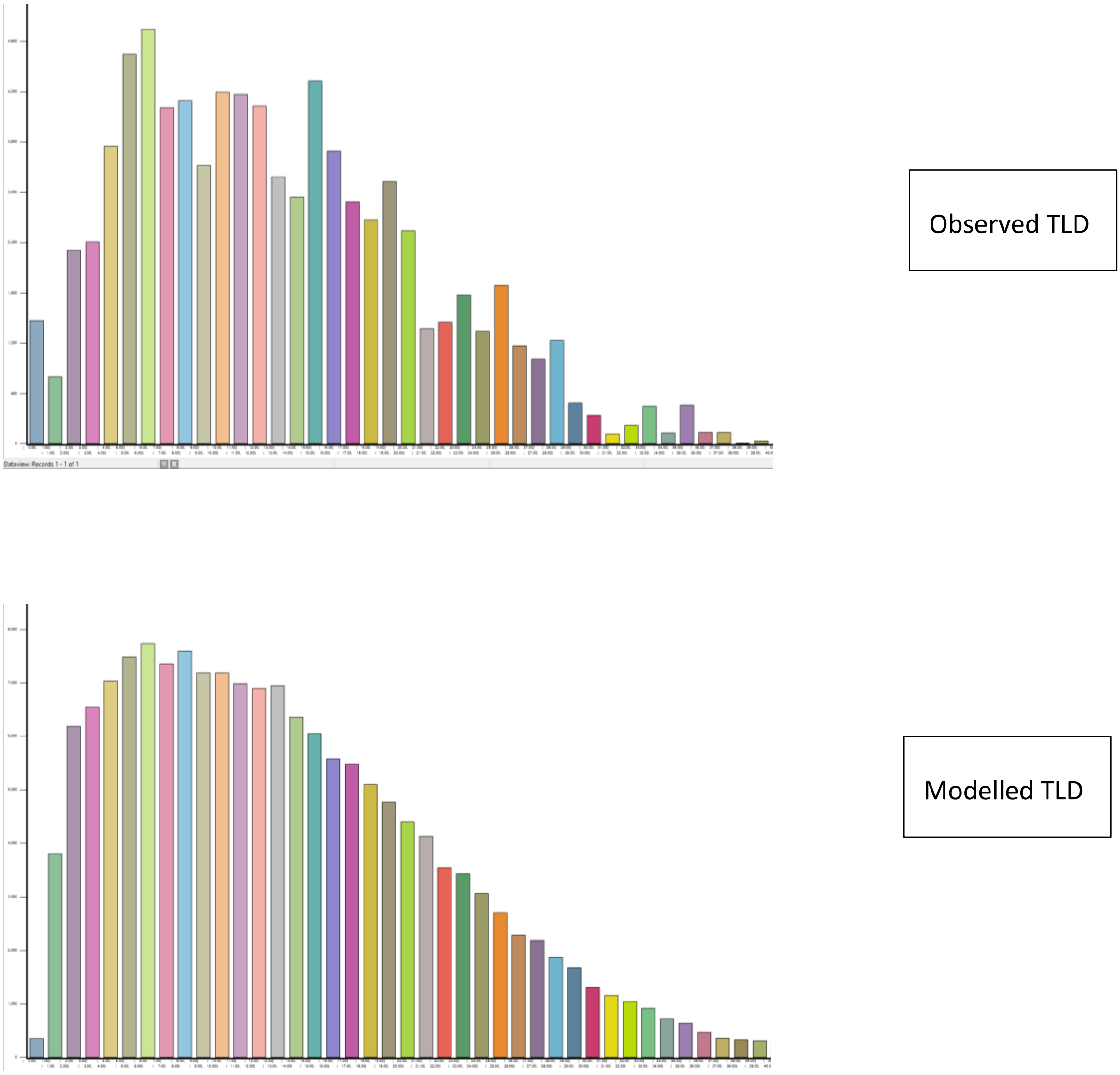

Figure 31: Trip length distribution, TLD, observed - modelled – public transport

3.2.2 Modal split

It was used the discrete choice models methodology to estimate and apply the modal split models.

The discrete choice models used in the modelling of transport demand are constructed according to the theory of random utility. They are based on the principle of utility maximization, where it is postulated that the individual q associates each alternative i with a stochastic type utility U_{iq}, choosing the alternative that maximizes its utility. The inability to assess, on the part of the analyst, all the attributes and variations in the tastes that govern the behaviour of individuals, as well as measurement errors, makes it necessary to consider that the utility is a random variable.

The random utility of an alternative is expressed as the sum of the observable or systematic components V_{iq} and the unobservable components, denoted as ε_{iq}, according to the following equation.

$$U_{iq} = V_{iq} + \varepsilon_{iq}$$

According to the theory of utility maximization, the individual q chooses the alternative i as long as the utility of this alternative is greater than that associated with any of the remaining j alternatives, both belonging to the set of alternatives $A(q)$ available to the individual q:

$$U_{iq} \geq U_{jq}, \quad \forall j \in A(q), \quad i \neq j$$

Ergo:

$$V_{iq} + \varepsilon_{iq} \geq V_{jq} + \varepsilon_{jq} \Rightarrow V_{iq} - V_{jq} \geq \varepsilon_{jq} - \varepsilon_{iq}$$

Since the analyst does not know $(\varepsilon_{jq} - \varepsilon_{iq})$, he can not say whether the previous expression is true or not and, therefore, can only state the probability that it will occur. In this case, the probability of choosing the alternative i is given by:

$$P_{iq} = Prob\{\varepsilon_{jq} \leq \varepsilon_{iq} + (V_{iq} - V_{jq}), \forall j \in A(q)\}$$

The residuals ε_{iq} are random variables with zero mean, which will generate different probabilistic models depending on the statistical distribution that is adopted.

Frequently, the expression that is used for the deterministic component of the utility is a linear function in the attributes and in the parameters, namely:

$$V_{iq} = \sum_{k=1}^{K} \beta_{ik} X_{ikq}$$

X_{ikq} being the value that the k-th attribute[3] assumes for the individual q, and β_{ik} being the parameter associated with that attribute.

The most used model in the estimation of transport demand is the multinomial logit, or simple logit, which assumes that the error terms (ε) are independent and identically distributed as a Gumbel distribution.

Therefore, the probability of and individual q chossing an anternative i is given by:

$$P_{iq} = \frac{e^{V_{iq}}}{\sum_{m=1}^{M} e^{V_{mq}}}$$

The models were calibrated using the data set collected in the Stated Preference survey (Willingness to Pay survey). This survey is fully described in the Appendix A (Complimentary Surveys) of Interim Report 1.

The main statistical indicator used to verify the general validity of the model is the likelihood ratio test: this statistical test compares the goodness of fit between two models. The likelihood ratio expresses how many times more likely the data are under one model than the other is. Commonly, the comparison is between an estimated model and the null model. The test statistic is calculated as $D = 2 \times [\ln(likelihood\ alternative\ model) - \ln(likelihoood\ null\ model)]$.

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[3] K may assume several attributes, such as travel time, costs, etc.

To verify the validity of each of the estimated parameters, the Student's t-test is used. This test verifies if the estimated coefficient differs significantly from zero. The probability that each coefficient is zero is given by the associated p-value.

3.2.2.1 Private cars

To estimate de modal shift of passengers from private cars to the BRT system, it was chosen to use a discrete choice model. The estimated model resulted in:

$$P_{Priv} = \frac{e^{-0.005 CostSaving}}{e^{-0.005 CostSaving} + e^{-0.807 - 0.084 TimeSaving}} \qquad P_{BRT} = \frac{e^{-0.807 - 0.084 TimeSaving}}{e^{-0.005 CostSaving} + e^{-0.807 - 0.084 TimeSaving}}$$

Where:

- $CostSaving$ is the difference of cost between the private car and the BRT system;
- $TimeSaving$ is the difference of total travel time between the BRT system and the private car.

The main statistical indicator used to verify the general validity of the model is the likelihood ratio test: this statistical test compares the goodness of fit between two models. For the model estimated above, the test statistic yields 44.725, which results in a p-value of 0%, a satisfactory result (less than 0.05), as can be seen in Table 9.

Table 9: Likelihood ratio test private car

Model	Log likelihood	Number of parameters	Likelihood ratio test	p-value
Null model	-626.605	0		
Final model	-604.243	3		
Result			**44.725**	**0.00**

To verify the validity of each of the estimated parameters, the Student's t-test is used. This test verifies if the estimated coefficient differs significantly from zero. The probability that each coefficient is zero is given by the associated p-value. The following table shows the estimated parameters and their associated statistics.

Table 10: Utility estimated parameters private car

Coefficient	Value	Standard error	t-test	p-value
ASC	-0.807	0.248	-3.26	0.00
$CostSaving$	-0.005	0.003	-1.85	0.06
$TimeSaving$	-0.084	0.014	-5.90	0.00

The model was applied on the private car demand matrix, to estimate the amount of passengers that shift from the private car to the BRT system. The model was applied on a parcel of the matrix, corresponding to the origin destination pairs of zones inside the influence area for the BRT corridors. The zones considered for Red line are shown in the figure below.

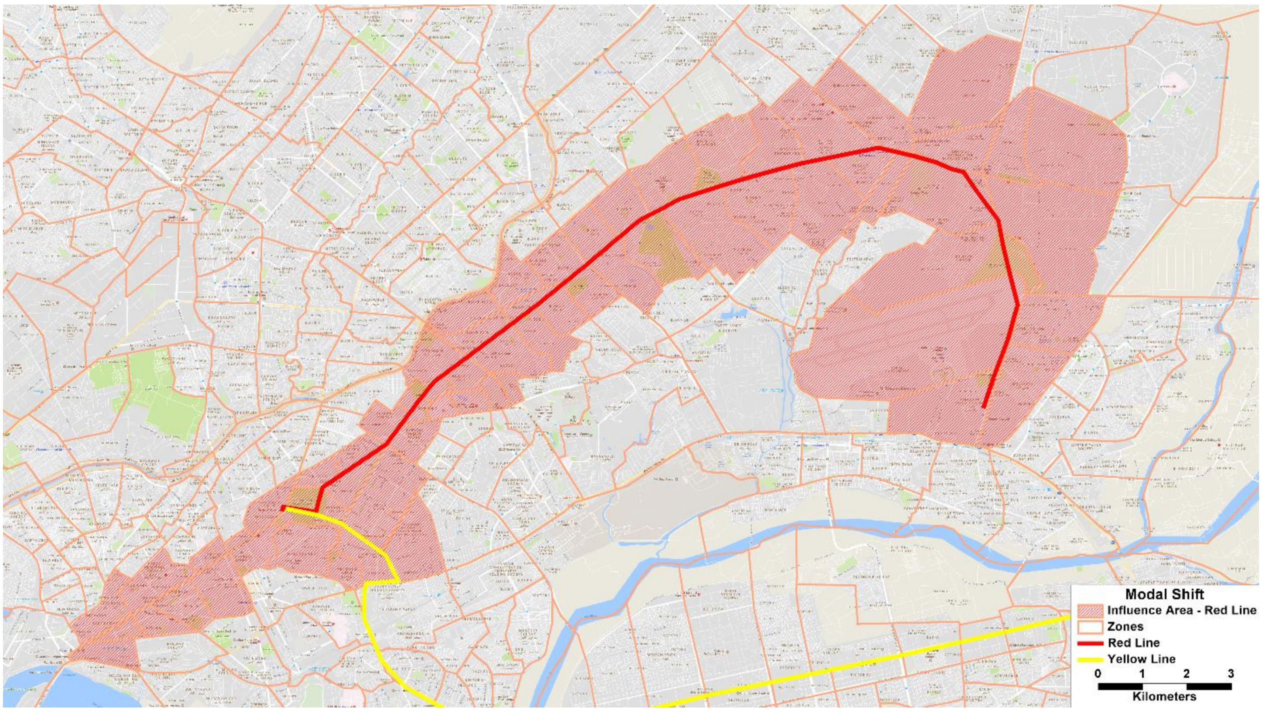

Figure 32: Zones considered in the Influence Area for the Modal Shift (Red line BRT example)

3.2.2.2 Motorcycles

To estimate de modal shift of passengers from motorcycles to the BRT system, it was also used a discrete choice model. The estimated model resulted in:

$$P_{Moto} = \frac{e^{-0.078 CostSaving}}{e^{-0.078 CostSaving} + e^{-0.202-0.092 TimeSaving}} \qquad P_{BRT} = \frac{e^{-0.202-0.092 TimeSaving}}{e^{-0.078 CostSaving} + e^{-0.202-0.092 TimeSaving}}$$

Where:

- $CostSaving$ is the difference of cost between the motorcycle and the BRT system;
- $TimeSaving$ is the difference of total travel time between the BRT system and the motorcycle.

For the model estimated above, the test statistic yields 124.479, with a p-value of 0%, as shown in Table 11 below.

Table 11: Likelihood ratio test motorcycle

Model	Log likelihood	Number of parameters	Likelihood ratio test	p-value
Null model	-935.749	0		
Final model	-873.509	3		
Result			**124.479**	**0.00**

The following table shows the estimated parameters and their associated statistics.

Table 12: Utility estimated parameters motorcycle

Coefficient	Value	Standard error	t-test	p-value
ASC	-0.202	0.105	-1.93	0.05
$CostSaving$	-0.078	0.008	-9.48	0.00
$TimeSaving$	-0.092	0.015	-5.99	0.00

The model was applied on the motorcycle demand matrix, to estimate the amount of passengers that shift from the motorcycle to the BRT system. The motorcycle demand matrix attainment is explained on item 3.3.3. The model was applied on a parcel of the matrix, corresponding to the origin destination pairs of zones inside the influence area for the motorcycle model shift. The zones considered are the same as the ones for private car and can be seen in the Figure 32.

3.2.2.3 Rickshaw

To estimate the modal split of passengers from Rickshaw to the BRT system, it was used a discrete choice model. The estimated model resulted in:

$$P_{Rick} = \frac{e^{-0.007CostRick}}{e^{-0.007CostRick} + e^{1.913-0.085CostBRT-0.012TimeSaving}} \qquad P_{BRT} = \frac{e^{1.913-0.085CostBRT-0.012TimeSaving}}{e^{-0.007CostRick} + e^{1.913-0.085CostBRT-0.012TimeSaving}}$$

Where:

- $CostRick$ is the Rickshaw fare;
- $CostBRT$ is the BRT fare;
- $TimeSaving$ is the difference of total travel time between the Rickshaw and the BRT system.

For the model estimated above, likelihood ratio test yields 105.028, with a p-value of 0%. This result can be seen in Table 13.

Table 13: Likelihood ratio test rickshaw

Model	Log likelihood	Number of parameters	Likelihood ratio test	p-value
Null model	-626.605	0		
Final model	-574.091	3		
Result			**105.028**	**0.00**

The following table shows the estimated parameters and their associated statistics.

Table 14: Utility estimated parameters Rickshaw

Coefficient	Value	Standard error	t-test	p-value
ASC	1.913	0.217	8.82	0.00
$CostRick$	-0.007	0.002	-4.66	0.00
$CostBRT$	-0.085	0.007	-12.06	0.00
$TimeSaving$	-0.012	0.006	-1.95	0.05

The model was applied on the sum of public and rickshaw demand matrices, to estimate the amount of passengers that split between the Rickshaw and the BRT system. The Rickshaw demand matrix was obtained as explained on item 3.3.4. The model was applied on a parcel of the matrix, corresponding to the origin destination pairs of zones inside the influence area for the Rickshaw model split. The zones considered are the same as the ones for private car and can be seen in the Figure 32.

3.2.3 Assignment

The calibration process based on the observed matrices requires the assembly of the assignment model, therefore this assignment model is done prior to the calibration process.

Transport demand assignment is based on the analysis and evaluation of trip strategies and alternatives for each pair of origin and destination zones. This strategy or choice for each user depends on the transport supply and on the costs of each possible combination of routes from the trip origin to the final destination. Trip cost is defined as the sum of the time spent on each stage of the trip and the monetary cost for each stage. The total travel time for a public transportation trip can be divided into:

- Access from the origin to a public transportation stop or station;
- Waiting time;
- In-vehicle travel time;
- Access between stops in case of transfers;
- Access from last stop to final destination.

In transport planning, the combination of travel times and travel costs is known as the generalized travel cost, mathematically defined by the following expression.

$$GTC = T_v + f_w \cdot T_w + f_{wa} \cdot T_{wa} + \frac{Fare}{TTSV}$$

Where:

GTC= Generalized Travel Cost;

Tv= In-vehicle time;

fw= Walking time weighting factor;

Tw= Walking time;

fwa= Waiting time weighting factor;

Twa= Waiting time;

Fare= Total fare;

TTSV= Travel time subjective value for each user.

The analysis finds the best available path for each trip between an origin and a destination by minimizing the generalized cost of commuting, expressed in time units. The model algorithm calculates elements such as waiting time, in-vehicle travel time and walking time. Waiting times and boarding probabilities are estimated based on the public transportation routes frequencies.

By bringing together all the results from the modelling algorithm (boarding probabilities, generalized costs and travel times for each cell within the origin destination matrix) the simulation produces passenger demand volumes on the entire network for each transport mode. This process is called assignment because a demand (trips) is assigned to specific paths. An assignment is therefore a routing algorithm for the trips of the studied area.

The selected software for this stage is EMME, a transport simulation software specialized in assignment. It finds the best path in terms of generalized cost for each pair of zones and assigns the demand of this pair of zones to such path. EMME works with the notion of assignment strategy, which is a generalization of the concept of a path.

This comes from the observation that there is often more than one path for a particular trip. This, in turn, is because different routes may have a common part, and therefore the shortest paths in this common part could use either of these routes.

In the specific case of the proposed BRT system, this effect is even more relevant, as a single origin-destination pair can be served by both the express and stopping lines of the BRT system. EMME strategy based assignment procedure considers that once a passenger is waiting at a boarding area, there may be several routes that suits him, and instead of choosing a route beforehand, the passenger boards the first bus of these routes that passes by the bus stop/BRT station.

It should be noted, though, that EMME algorithm does not assume that passengers can board any route that serves his or hers origin destination pair, but only those that reduce the general cost. Therefore, if a route has a higher fare and the passenger "decides" not to pay for it, the passenger will wait longer for a cheaper option. These decisions are made by the assignment model based on the generalized cost, presented above.

3.3 Structuring and Calibrating the Model

Structuring the model for optimal results requires the definition of the following:

- Geographic base map that positions the city in global latitude/longitude coordinates for accurate model referencing;
- Updated road network;
- Transportation zones for which accurate travel demand information is available;
- Existing public transportation route itineraries, frequencies, vehicle typologies and fares;
- Weigh factors for the generalized cost calculation and an estimation of the value of time (Travel time subjective value for each user, TTSV);
- Origin destination trip matrix stating the travel desires between the transportation zones defined previously within the area of analysis;
- Demand modelling applying (generation/distribution, modal split and assignment).

3.3.1 Public Transport mode

Following the process of structuring the model, the demand source was established as an origin destination trip matrix. As stated before, the following surveys were carried out: Stop-based and On-board Origin and Destination Surveys and Frequency and Occupancy Survey, surveys that were used as basic material to build a trip matrix between the transportation zones previously defined for the network. This initial matrix, or seed matrix, which was directly derived from the surveys, was used as an input for the model. That matrix was later adjusted through the process described below, in order to approximate the modelled scenario to the observed data.

This seeded matrix is itself used as a seed to a demand adjustment process, which uses the volumes found by the frequency and visual occupancy surveys and the boarding and alighting surveys to approximate the model results to the observed data. This process increases the values in the cells whose trips passes through these counting points when the modelled value is smaller than the observed one, or decrease the values in the cells when the opposite happens. The matrix that comes out of this process is the adjusted matrix, which is used as the base year demand matrix.

The application of this process is based on the fact that there are often divergences between the volumes observed in the field and the models.

The tool to be used is based on a least squares optimization problem, in which the objective function to be minimized considers the error between observed and modelled volumes, as well as the difference between the original and adjusted matrix. The algorithm uses the gradient method, resulting in iterations that advance with restriction in the direction of greater inclination. At the same time, the mechanism has control criteria that prevent the matrix from deforming to the detriment of the quality of other results. This procedure is executed through a specific module in the software EMME.

The process is enriched by the presence of a greater number of checkpoints of observed volumes. To verify the results is used the R^2 indicator.

The following graphic shows the comparative between the results of the assignment model (Vertical Axis) and the observed public transport passengers (Horizontal Axis). The linear regression presented an R^2 value of 0.989, which indicates a great correlation between the modelled and the observed data.

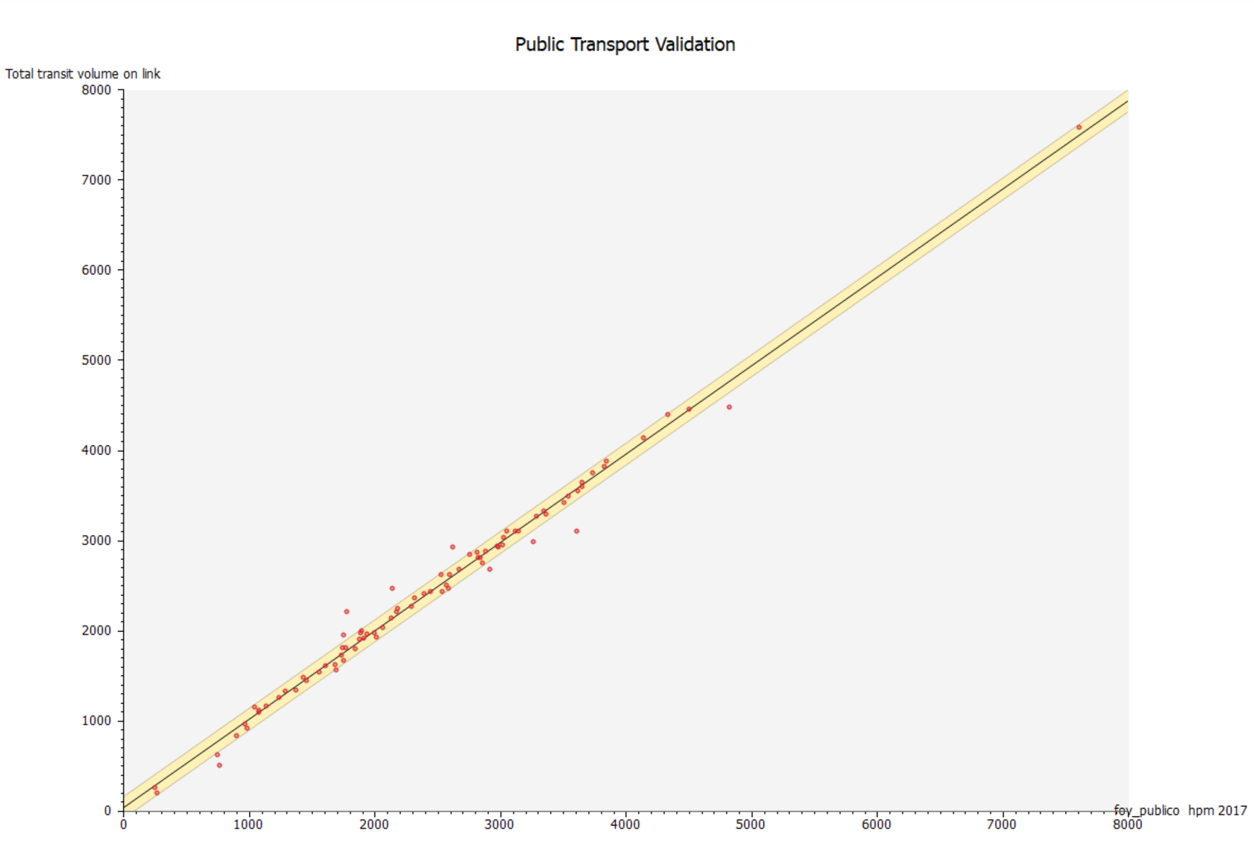

Figure 33: Linear Regression of public transport modelling results at peak hour

Each point in this figure is a survey point (the two directions at a particular place are considered two "points" for this analysis). The observed value is the surveyed flow of passengers per hour and the modelled values are the corresponding values as obtained by the model.

While the first number is obtained directly from the surveys, the second one is produced by the model based on the matrix and on the network, without further use of the surveys. This is fundamental because it means that the network and the matrix can be adapted to represent other scenarios (for example the scenario with the BRT), without depending on new surveys.

The objective of the model calibration is, therefore, to obtain modelled values as similar as possible to the observed ones. The figure above shows that the values are indeed very similar, being close to the line indicating equality (which would be a 45° line). These results validate the model in the sense that the volumes it produces are very similar to values observed in reality in the base scenario. Therefore, it is expected that the model will also accurately reflect hypothetical projected scenarios.

The following image illustrates the main desire lines of the public transport at peak hour, which are a tool to analyse the most relevant connections in the city.

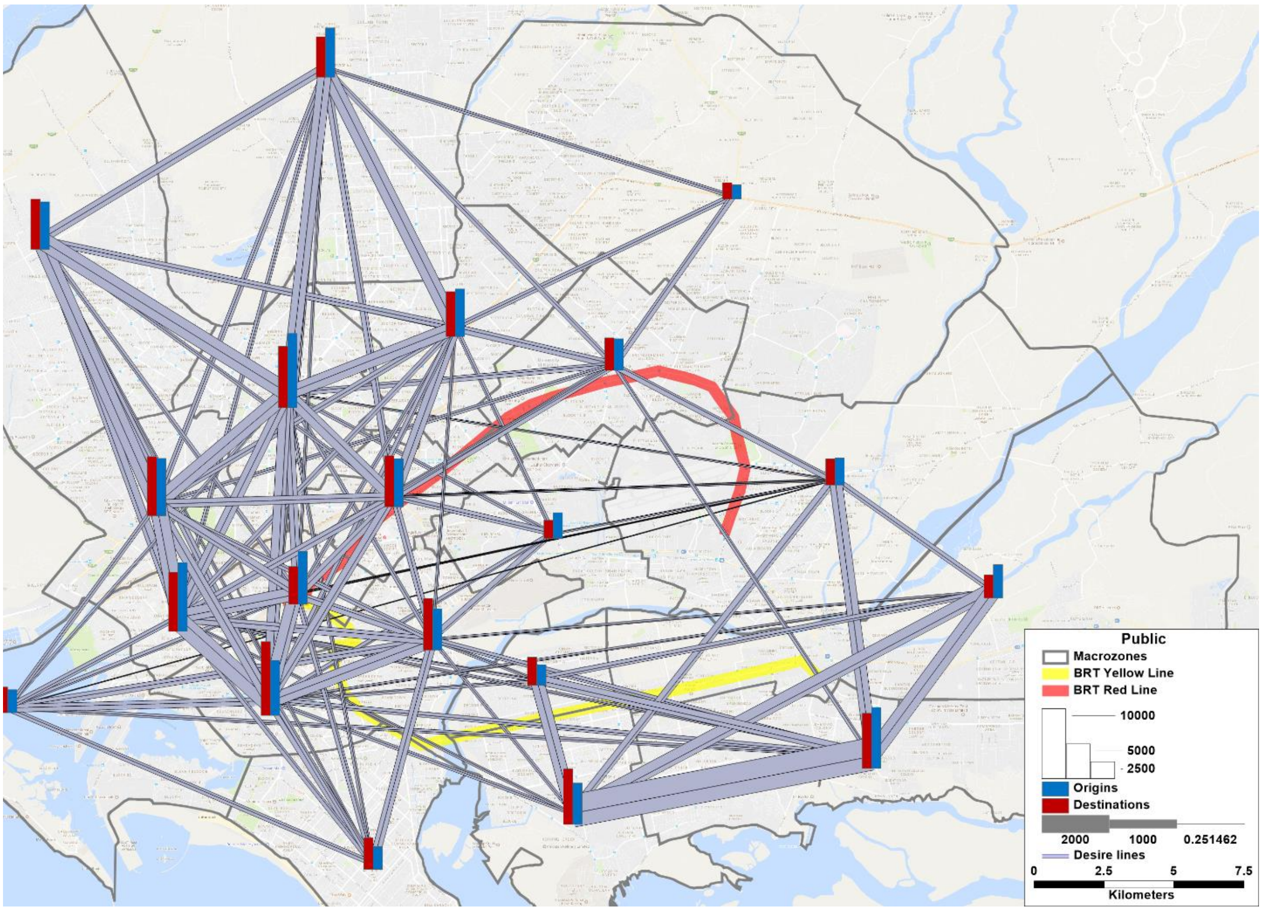

Figure 34: Main desire lines of public transport at peak hour

The desire lines structure was based in groupings of zones in order to improve visualization. With the previous figure, it is possible to highlight some relevant connections in the city:

- Korangi Industrial Area and Landhi Industrial Area;
- Central region and several surrounding areas;
- University region and several surrounding areas.

It can be seen that Numaish connects with several other regions of the city, including areas served by both Red and Yellow lines.

From the calibrated OD trip matrix, the following figure includes the trip length distribution, TLD, for the current public transport. The average distance is 14 km and can be observed that trips greater than 30 km are rare.

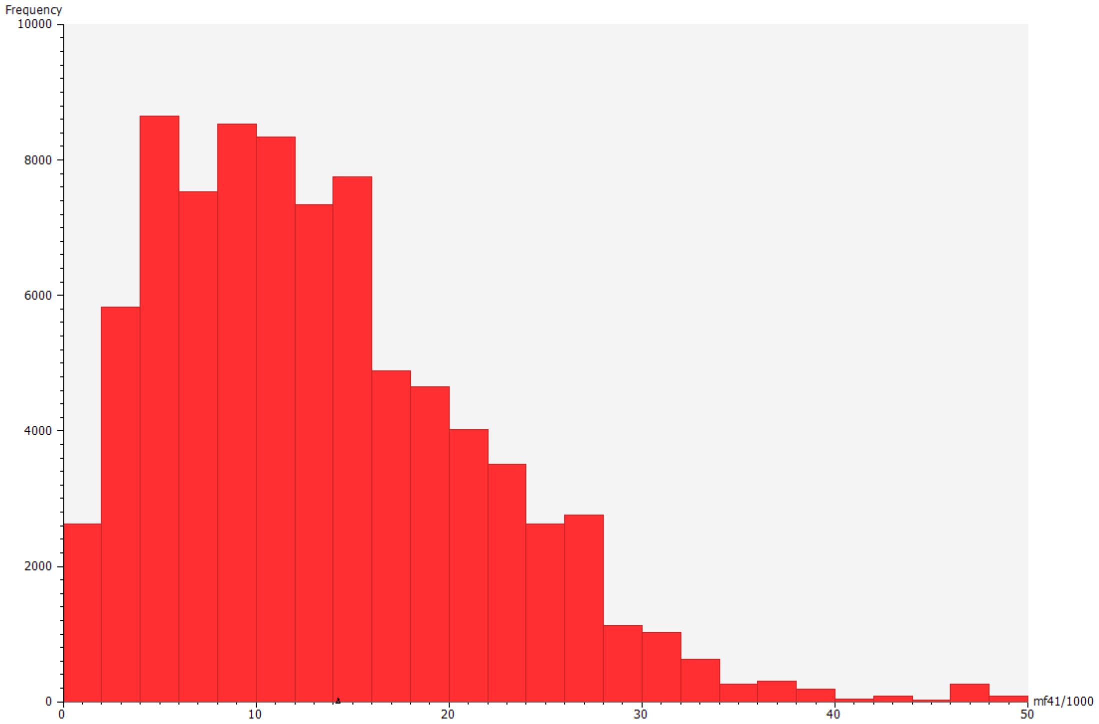

Figure 35: TLD public transport a.m. peak hour

3.3.2 Private car mode

In order to determine the demand matrix of this mode, it was used the JICA data on private car trips as seed matrix and it was adjusted based on the volumes found by the volume counting surveys, carried out in this project.

The volumes used come from the frequency and visual occupancy surveys. The adjustment process increases the values in the cells whose trips passes through these counting points when the modelled value is lesser than the observed one or decreases the values in the cells when the opposite happens. The matrix that comes out of this process is the adjusted matrix that is used as the private car demand matrix.

The following figure illustrates the main desire lines for private car's demand.

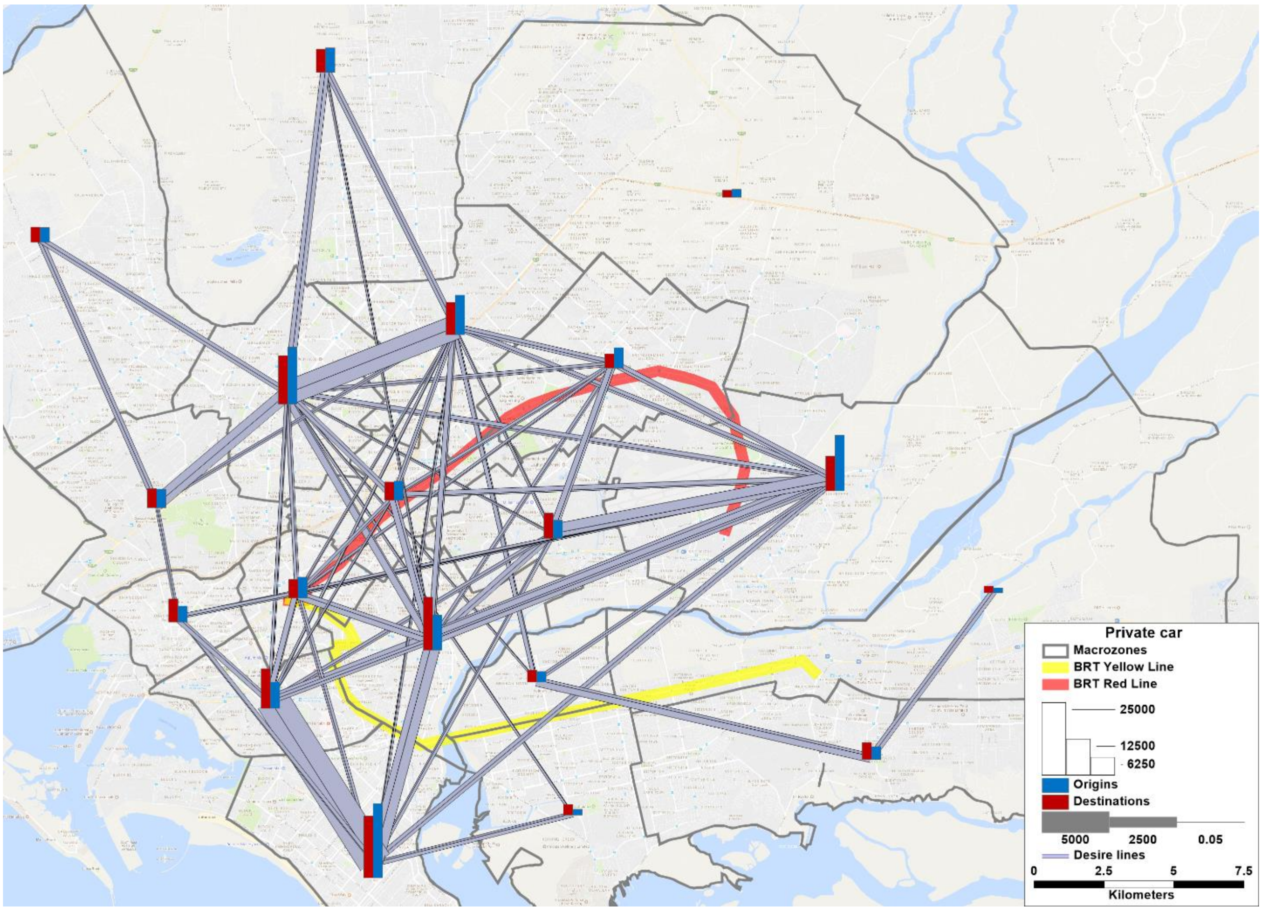

Figure 36: Main desire lines of Private Cars at peak hour

The following figure includes the trip length distribution, TLD, for the current private car demand. The average distance is 11 km.

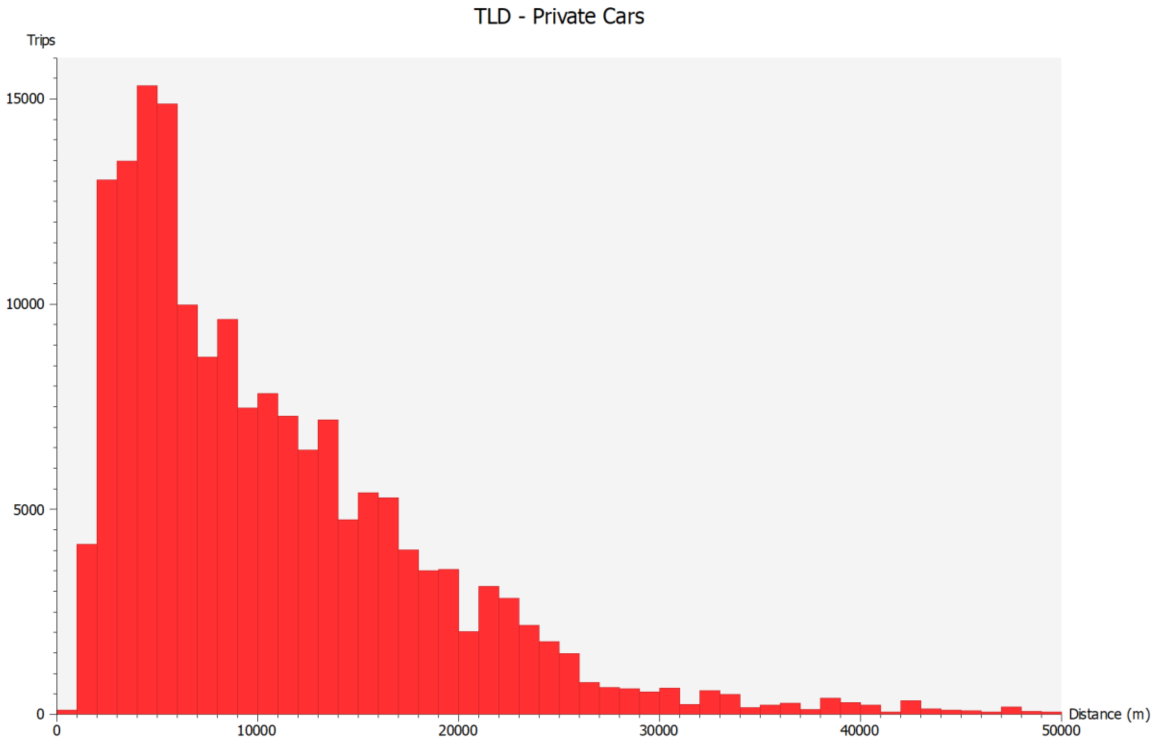

Figure 37: TLD private cars trips (a.m. peak hour)

3.3.3 Motorcycle mode

In order to determine the demand matrix of this mode, it was used the JICA data on motorcycle trips as seed matrix and it was adjusted based on the volumes found by the volume counting surveys, carried out in this project.

The volumes used come from the frequency and visual occupancy surveys. The adjustment process increases the values in cells whose trips passes through these counting points when the modelled value is lesser than the observed one or decreases the values in the cells when the opposite happens. The matrix that comes out of this process is the adjusted matrix that is used as the motorcycle demand matrix.

The following figure illustrates the main desire lines for motorcycle’s demand at peak hour (AM).

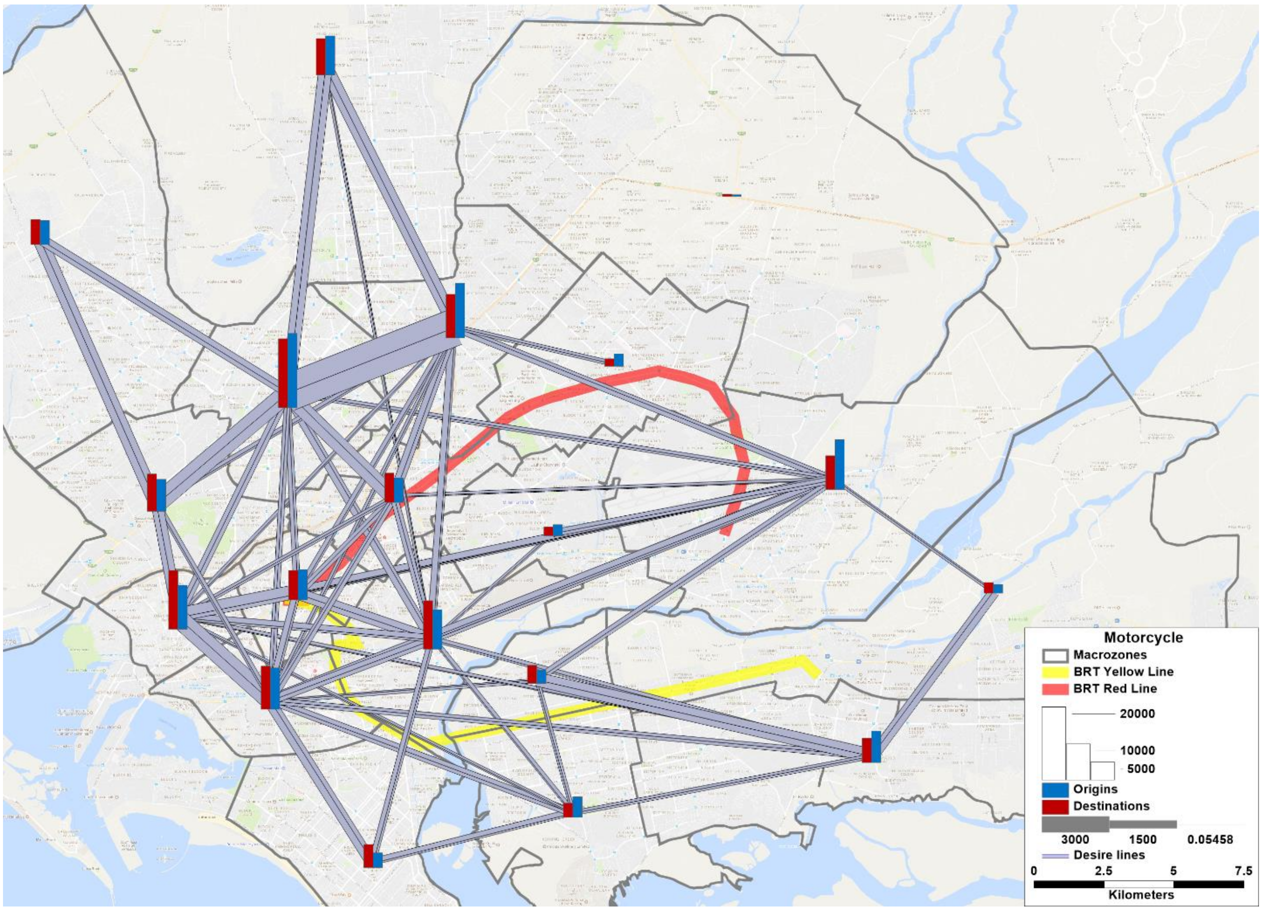

Figure 38: Main desire lines of Motorcycle at peak hour

The following figure includes the trip length distribution, TLD, for the current motorcycle demand. The average distance is 10 km.

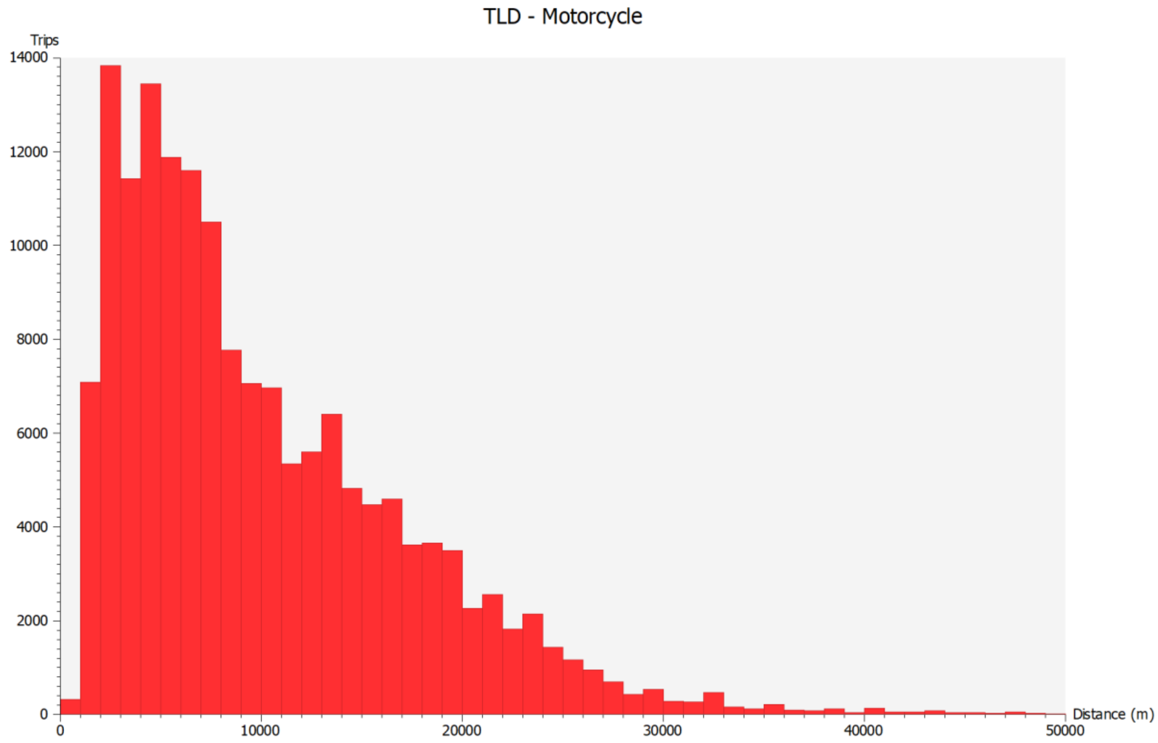

Figure 39: TLD motorcycle trips (a.m. peak hour)

3.3.4 Rickshaw mode

The Rickshaw matrix was estimated by a procedure analogous to that described in in the previous item. The seed matrix for the adjustment process was the public transport matrix. However, only the matrix cells that have a total travel distance of less than 10 km in the current scenario were considered. The other matrix cells were set to zero.

The volumes used come from the frequency and visual occupancy surveys. The adjustment process increases the values in the cells whose trips passes through these counting points when the modelled value is lesser than the observed one or decreases the values in the cells when the opposite happens. The matrix that comes out of this process is the adjusted matrix that is used as the Rickshaw demand matrix.

The following figure illustrates the main desire lines for Rickshaw's demand.

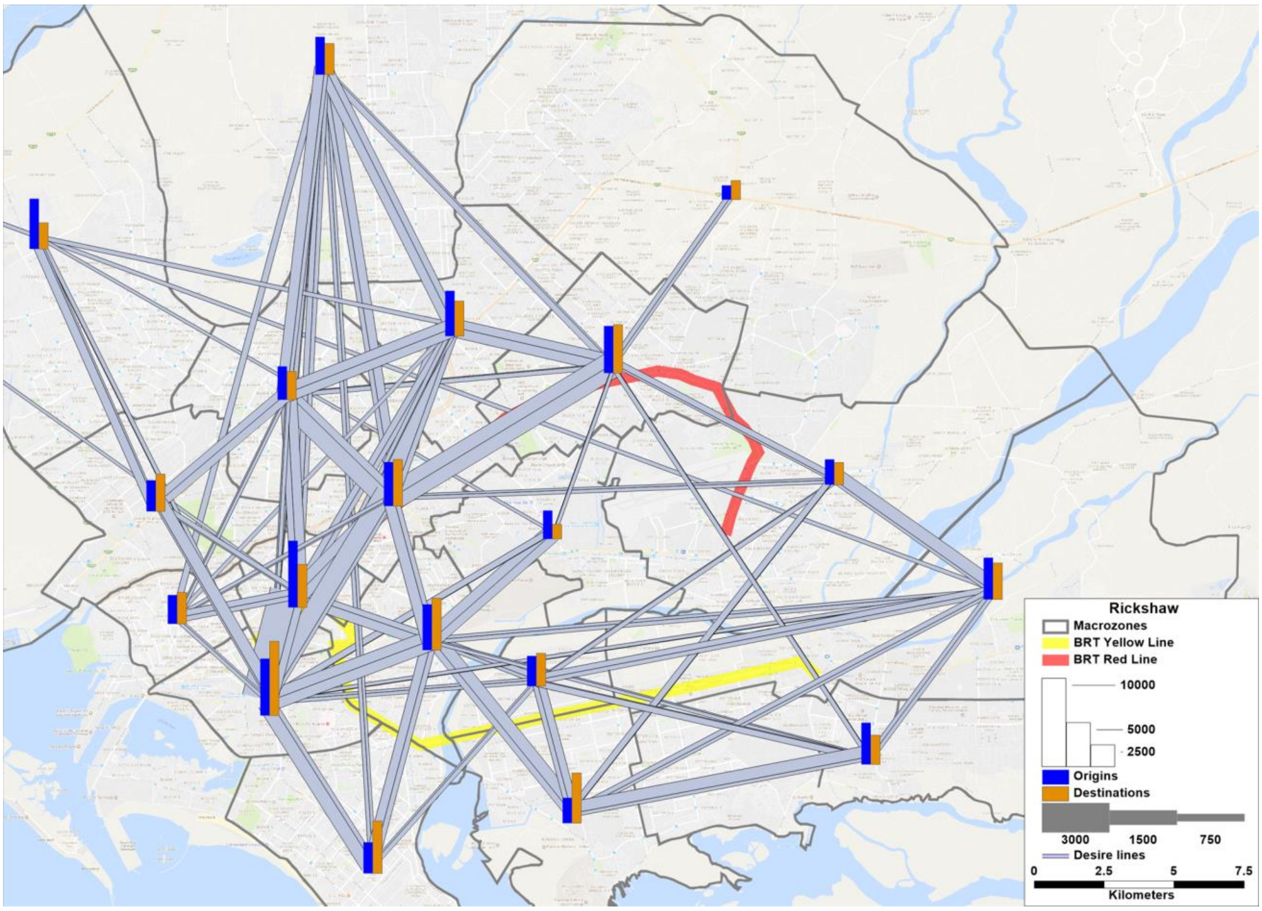

Figure 40: Main desire lines of Rickshaw at peak hour

The following figure includes the trip length distribution, TLD, for the current Rickshaws demand. The average distance is 6 km. It is important to keep in mind that this TLD considers the walk distance.

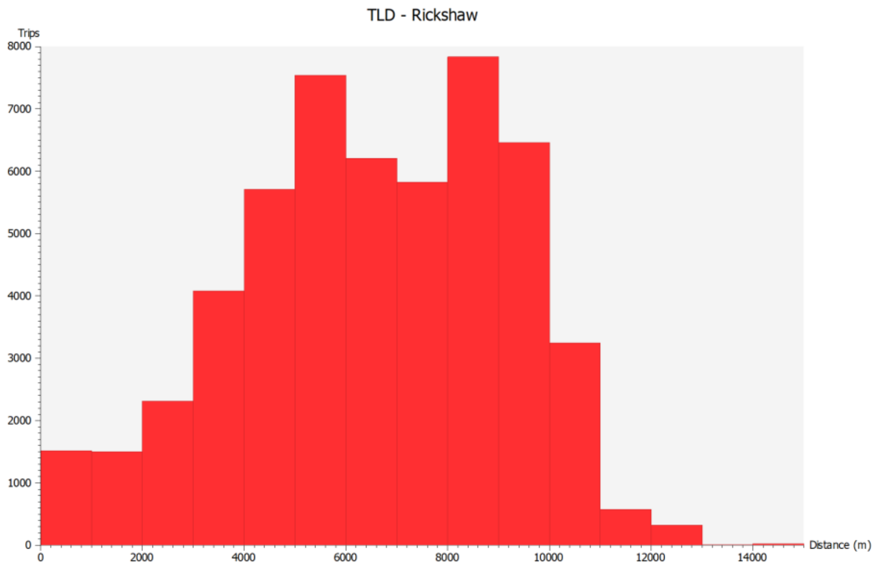

Figure 41: TLD Rickshaw at peak hour

The following figure illustrates an example of the Richshaw’s demand that shift to BRT (red line). It can be observed that the greater share of Rickshaw's demand is near the corridor, which is part of the premises of the application of the model, where only the demand inside the influence area, at both origin and destination, are considered as potential BRT demand.

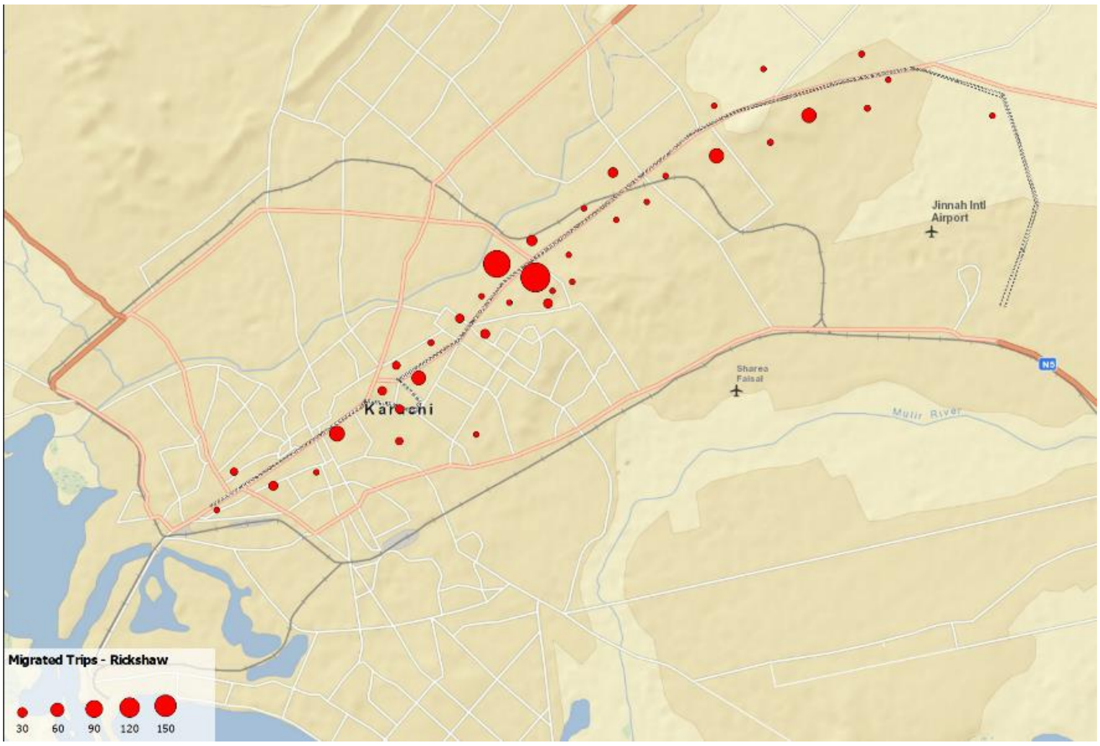

Figure 42: Example of composition percentage of BRT's demand (scenario with public and rickshaw)

3.4 Base Scenario

The following items present details of the processing involved in public transport modelling for the base scenario, as well as the resulting volumes of the model for each one. The Appendix B.1 – Transport Modelling Dataset, from Interim Report 1, contains base scenario files such as the network, public transport routes and traffic and transit OD matrices used in the model.

As stated before, the model was calibrated using information collected from the field surveys (dispatch frequencies, passenger volumes, boarding and alighting passengers at stations, etc.).

Having the survey points as control points within the model to monitor the gap between the modelled and existing situations, the model was adjusted through internal trip matrix adjustments procedures. This means that several parameters were changed so that the resulting model reflects as well as possible the real transportation conditions of Karachi. This parameters reflect real (though unobserved) characteristics and therefore it is of the uttermost importance that their values are reasonable, not too far from what is seen in other cities, with ratios that respect logic and present the correct signs.

There are two main methods used to estimate those parameters. The first one is processing the surveys data without using an assignment model and then using these values on the model. The second method is to initially input generic standard values and then proceed by slightly changing its values until the model results are similar to the observed values of the surveys. The first method was used to obtain the value of time and the second method was used for all the other parameters.

The value of time is the factor that relates time-based impedances and money-based impedances. The Transport Stated Preference Survey was used to determine a range of values of times that would be compatible with the rational hypothesis. The value of time that respected the range of the greatest number of surveys and therefore the most likely one is 66.49 PKR / hour.

The penalty factors of waiting and walking were estimated to be 1.5 and 2.5, respectively, and the walking speed was considered 4km/h, which is a standard value. This walking time penalty is quite high but, given the climatic conditions, it can be considered reasonable.

The line frequencies were also subject to estimation. Using the Transport Frequency and Occupancy Survey, the frequency for each line was estimated as shown in the item **2.2** – Transport Frequency and Visual Occupancy Survey. In addition, the speed of the routes was estimated based on the GPS Survey and Google data.

Finally, the flow results of public transport modelling for the base year scenario can be analysed in the following maps. The Figure 43 presents the volume of passengers in the current public transport system in Karachi. In addition, the Figure 44 presents the boards and alights of public transport.

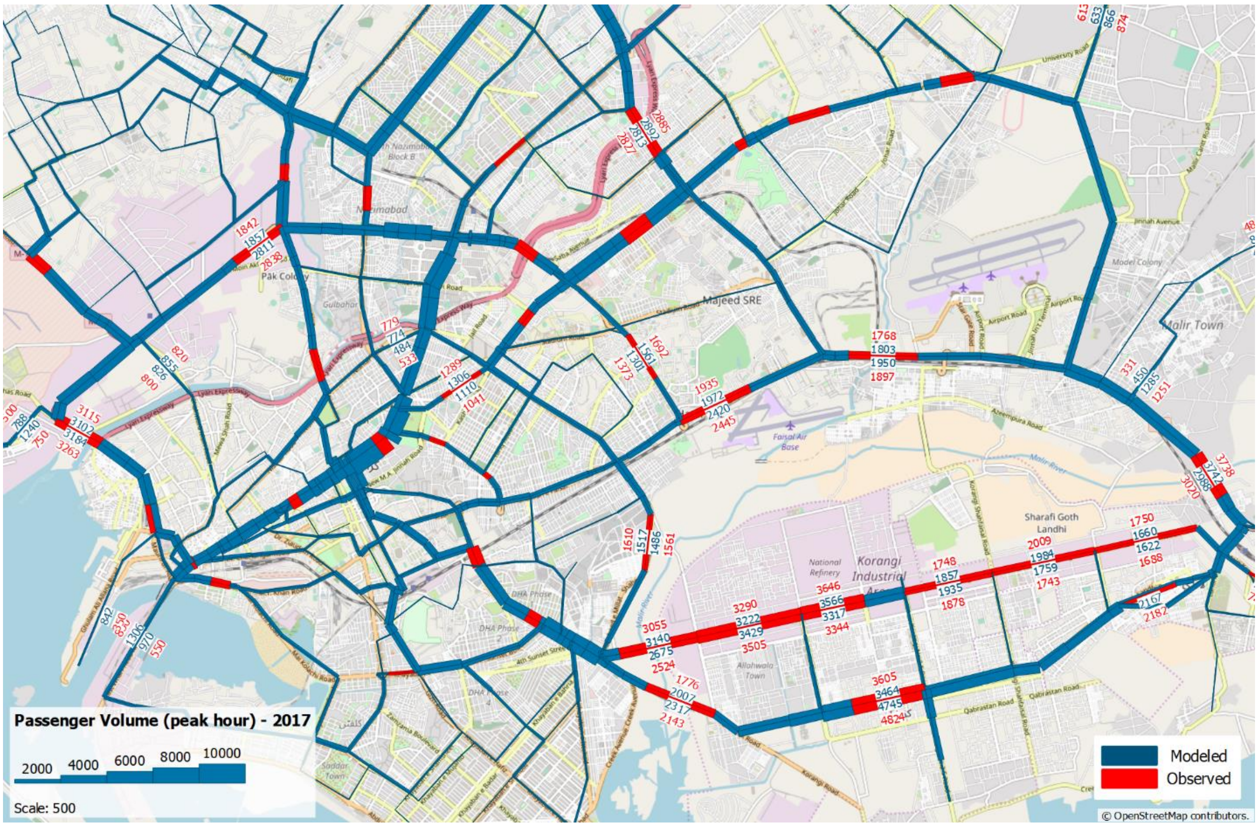
Passenger Volume (peak hour) - 2017
2000
4000
6000
8000
10000
Scale: 500
Modeled
Observed
© OpenStreetMap contributors.

Figure 43: Volume in public transport in Karachi at a.m. peak hour

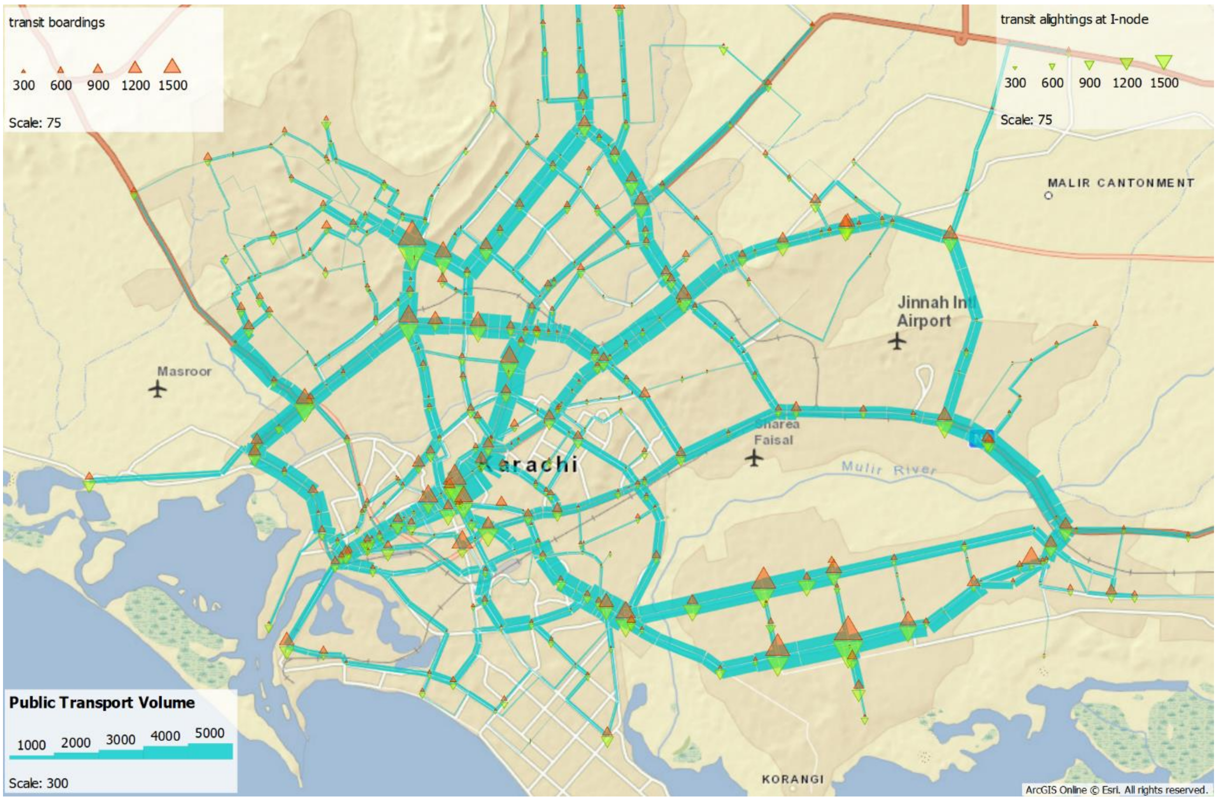

Figure 44: Board and Alight for Public Transport system in Karachi at a.m. peak hour

As can be observed, the current demand in the red line corridor is around 8 thousand passengers in both directions and in the yellow corridor, 7 thousand passengers. On the map it is possible to see the approximation of the flows observed with the modelling results.

The following table contains the total number of trips at the morning peak hour for each of the public transport modes according to the model.

Table 15: Number of trips per mode at peak hour

Mode	Peak hour passengers
Mini bus	83,674
Large bus	28,891
Coach	46,434
Total	**159,000**

The complete OD table with information corresponding to the morning peak hour can be found in Appendix B.1 – Transport Modelling Dataset, from Interim Report 1. The following image illustrates the OD table by showing the total number of trips with origin and with destination for every traffic zone for public transport.

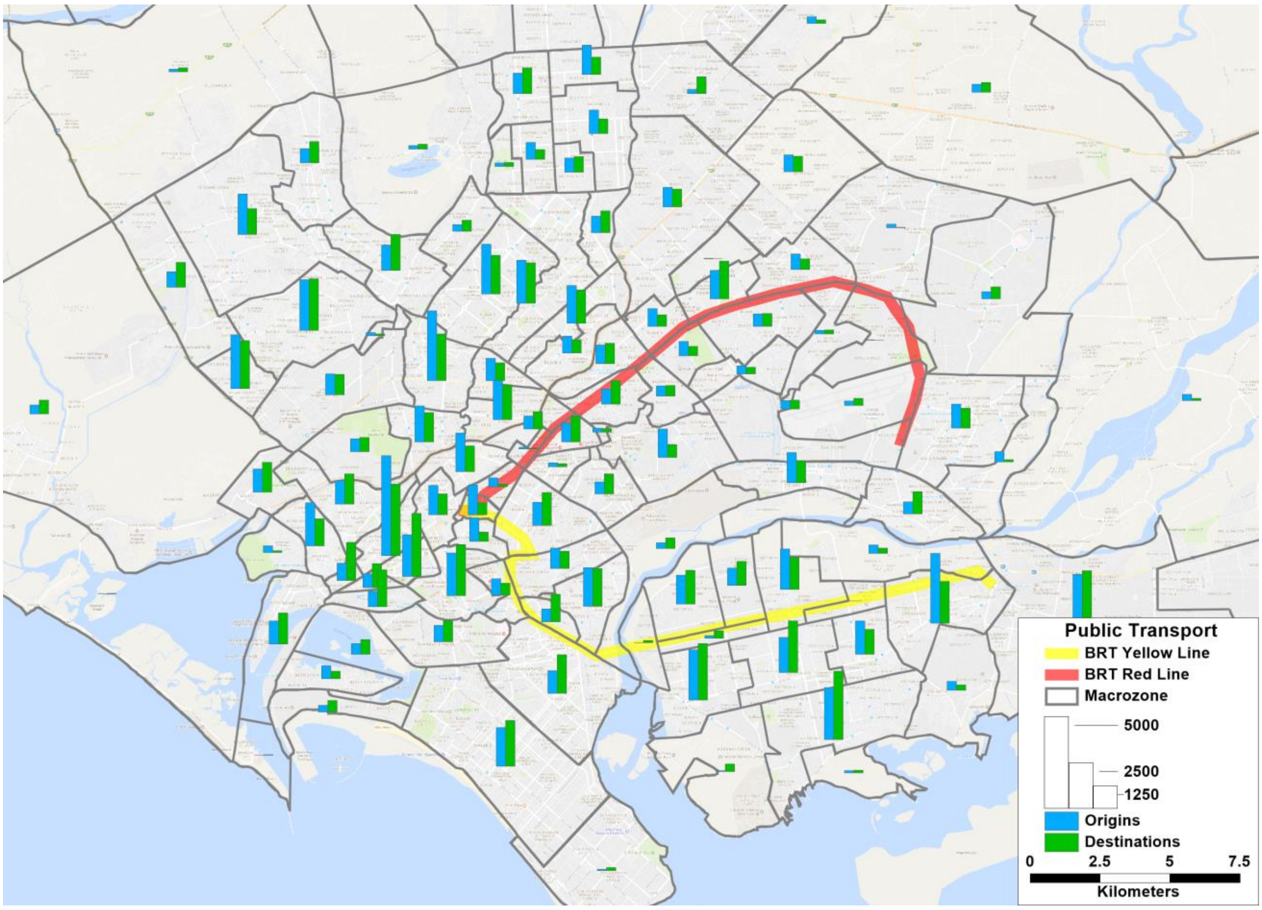

Figure 45: Origins and destinations per traffic zone for public transport

The image above shows that there is a high density of origins and destinations in the proximities of Yellow Line corridor, especially near Dawood, Korangi Industrial Area and KPT Interchange. Regarding the Red Line, the region around the University of Karachi and NIPA draw attention due to elevated volume of trips. The Common Corridor is also another relevant area, with a great volume of trips along M. A. Jinnah road.

As in the case of public transport, the modelling process for the rickshaws, private cars and motorcycles has been carried out the same way. The results for rickshaws are presented in the figure below.

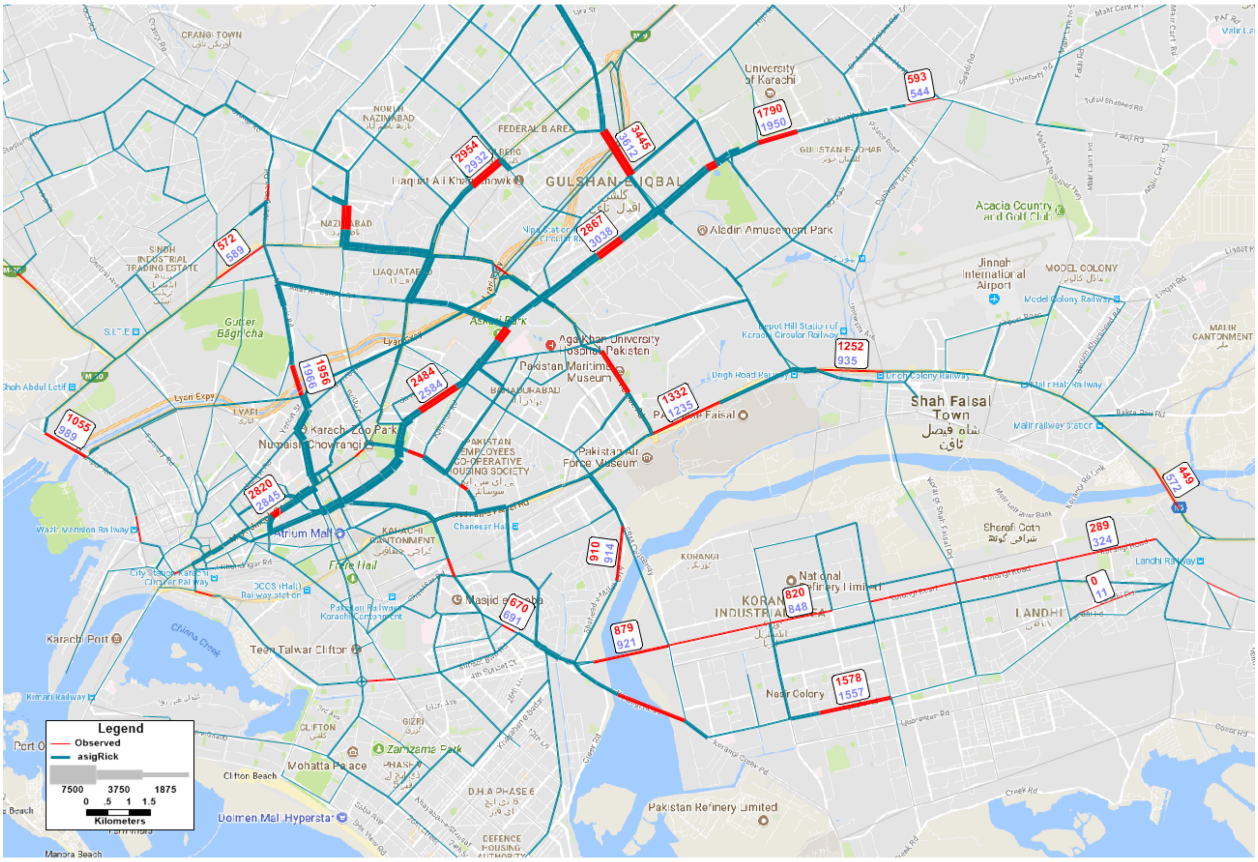

Figure 46: Volume in Rickshaw mode at a.m. peak hour

On the red line corridor, important values stand out, with loads close to 3,000 pas / h in both directions. Along the yellow corridor, the loads are around 800 pas / h, a relatively low value.

The passenger flows from the trips that use the private car as transport mode after the calibration can be seen in the Figure 47.

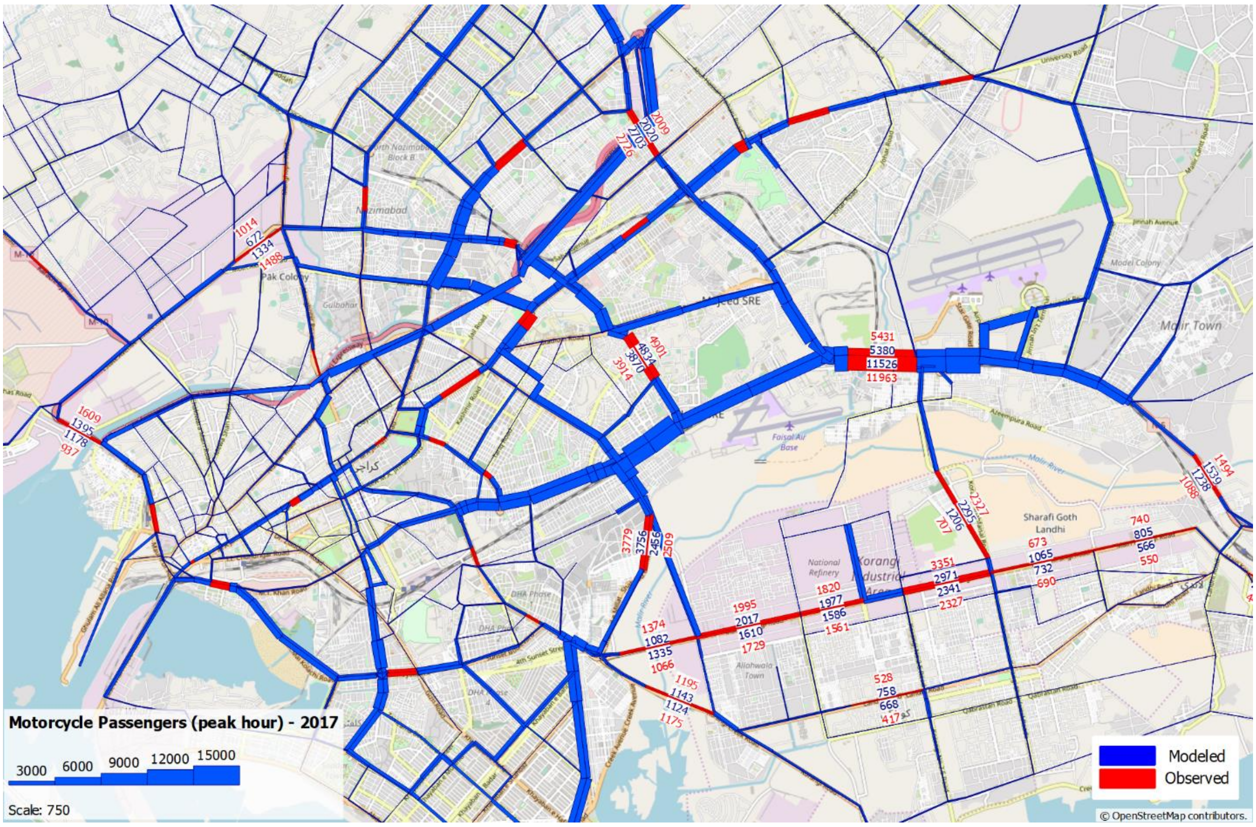

Figure 47: Passenger volume in Private Cars at a.m. peak hour

It can be noticed that high flows from this mode occurs near the red line, specifically at the University Road, where some sections have more than 10,000 passengers towards the centre. The yellow line have a significant car passenger volume on Korangi Road, where the critical section exceeds 2,300 passengers/hour towards the centre.

The following image shows the total number of trips with origin and with destination for every traffic zone for private cars.

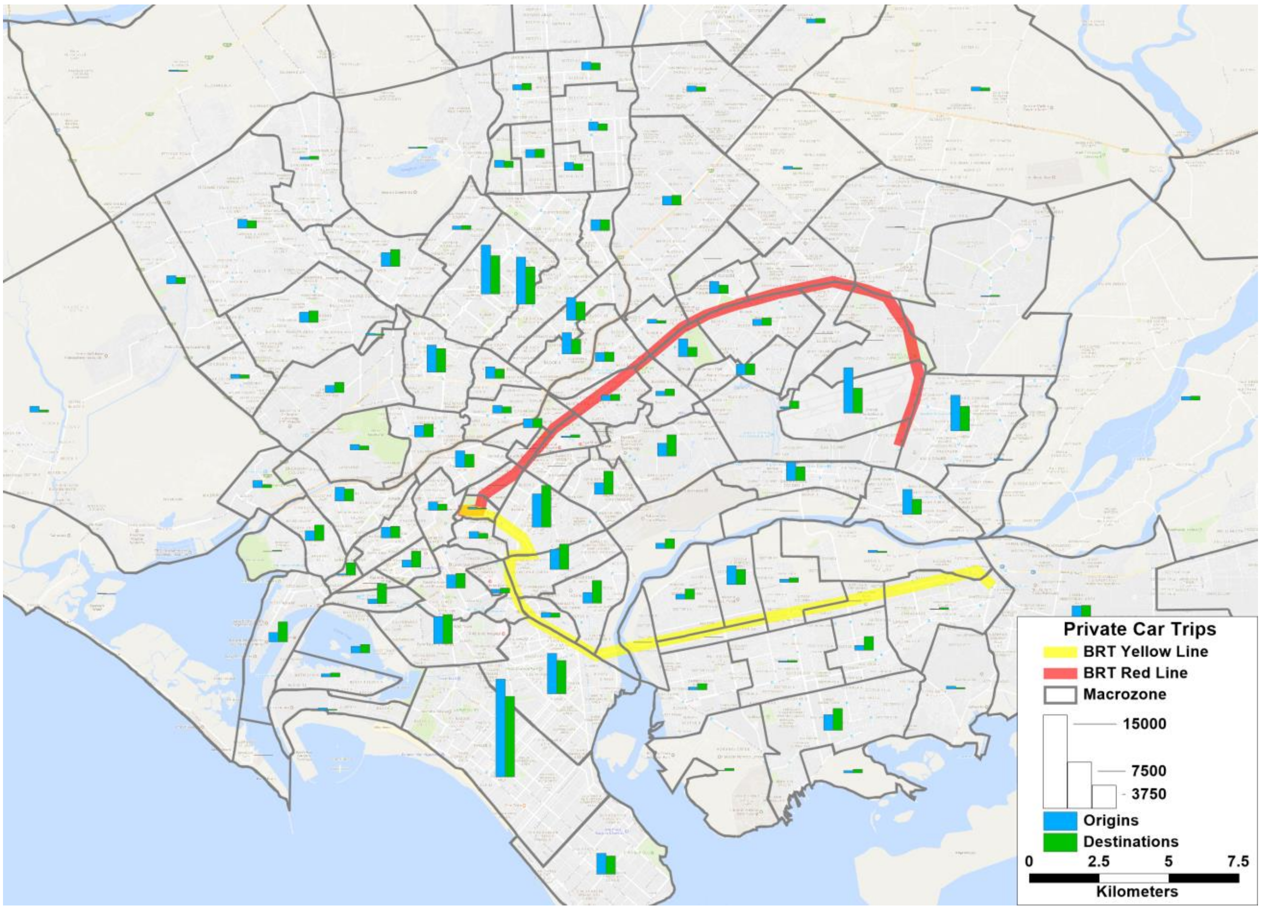

Figure 48: Origins and destinations per traffic zone for private cars

The image above shows that there is a high density of origins and destinations in the proximities of the city’s centre. The south region, especially near Gizri, has many trips that prefer the private car as the transport mode. The Airport is also an important region of car trip creation and attraction.

The passenger flows from the trips that use motorcycles as transport mode after the calibration can be seen in the Figure 49.

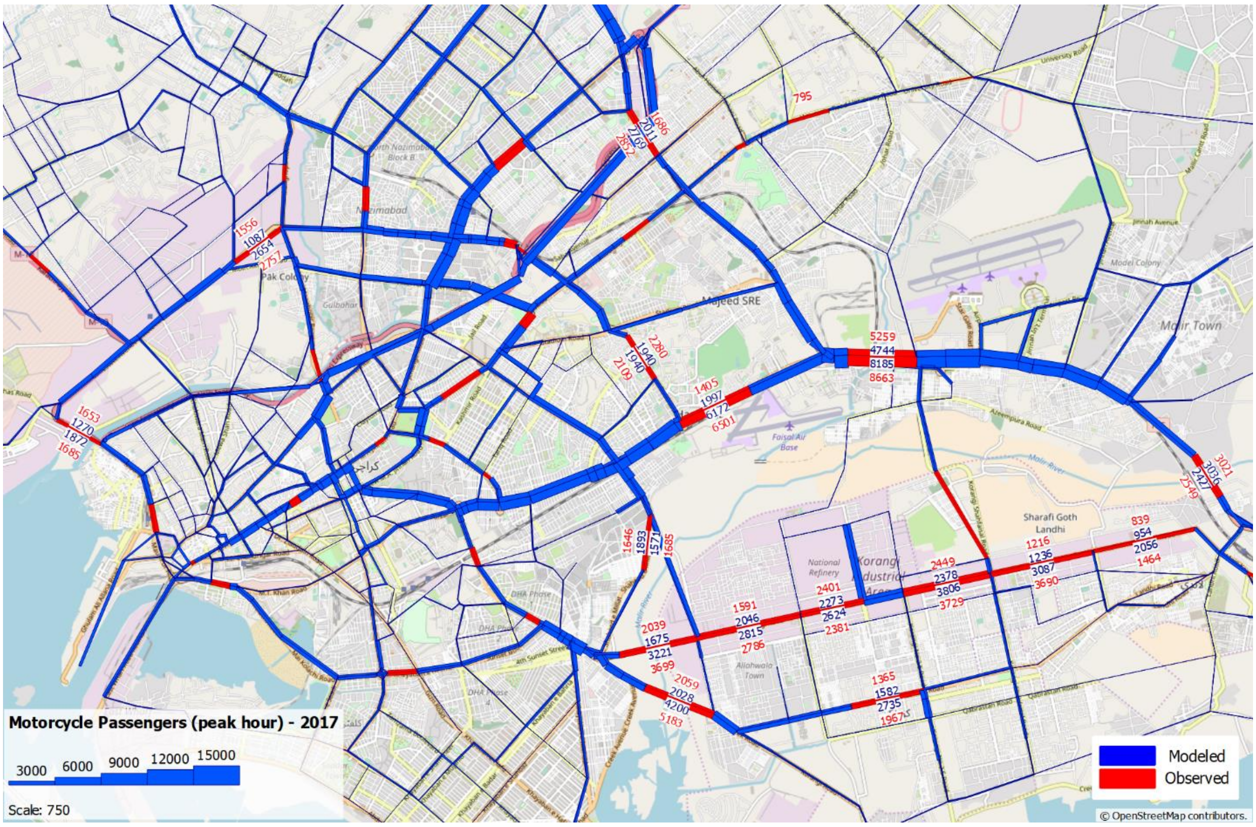

Figure 49: Passenger volume in Motorcycle at a.m. peak hour

It can be noticed that high flows from this mode occurs near the red line, specifically at the University Road, where some sections have more than 8,000 passengers towards the centre. The yellow line have a significant motorcyclist volume on Korangi Road, where the critical section exceeds 3,000 passengers/hour towards the centre.

The following image shows the total number of trips with origin and with destination for every traffic zone for motorcycles.

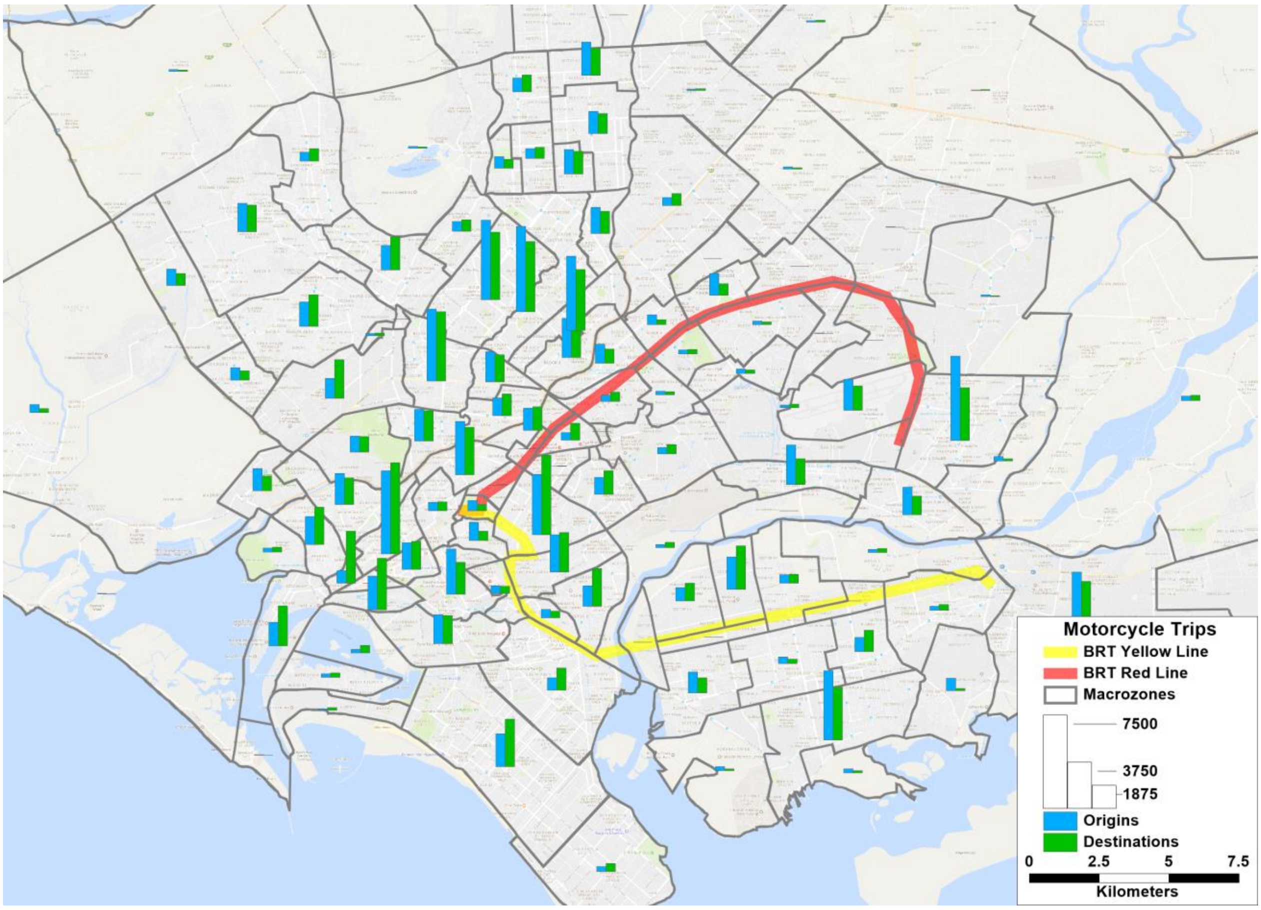

Figure 50: Origins and destinations per traffic zone for motorcyclists

The image above shows that there is a high density of origins and destinations in the proximities of the city's centre. Near the yellow line, the Jamshed Town, is also an important region of motorcycle trip creation and attraction. In addition, the north region, especially near Bufferzone, has many trips that prefer the motorcycles as the transport mode.

As indicated above, these segments of demand (rickshaws, private cars and motorcycles) will be subjected to the modal split process to obtain the portion of demand that would migrate to the BRT system.

4. Population Forecast

Transport infrastructure projects like the Karachi BRT have a great impact on the population's life in the long-term perspective. Therefore, it is also important to forecast the population growth, in order to understand the possible implications of that in the future of the transportation system and its infrastructure

The population forecast per zone was estimated using a top down analysis. The main idea of this approach is to go from a bigger perspective and walk through smaller groups, in a way that all these groups keep attached with equivalent premises. Therefore, first the Pakistan's population was projected for a period of time, then Karachi's population was estimated and, finally, Karachi's population per zone was forecasted, as shown illustratively in Figure 51.

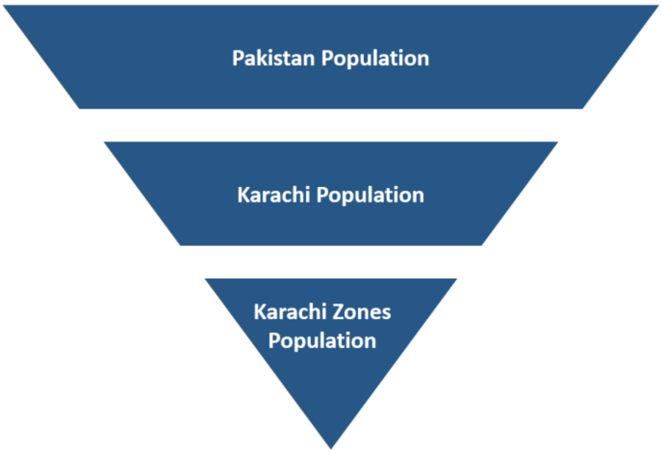

Figure 51: Top-down approach for population forecast

For Pakistani population forecast it was used official data from USDA[4] with values of population, year per year, from 1980 to 2030, noting that estimated projections start from 2010. Table 16 presents the total values of population for the years of 1980, 1990, 2000, 2010, 2020 and 2030, and Figure 52 presents Pakistani growth rate per year for the whole period.

Table 16: Estimated Pakistani Population (1980 – 2030)

Year	Population
1980	85,219,117
1990	118,816,188
2000	152,429,036
2010	184,404,791
2020	213,719,471
2030	242,861,643

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[4] https://www.ers.usda.gov/data-products/international-macroeconomic-data-set/, accessed on July 10th, 2017.

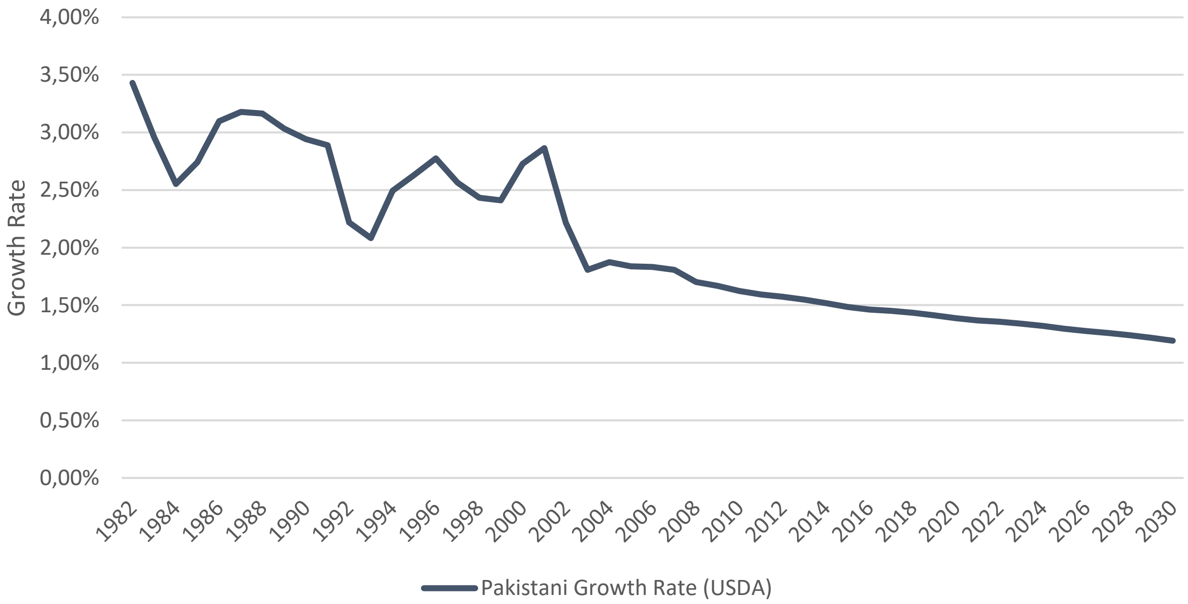

Figure 52: Pakistani growth rate

Source: USDA, 2016

Using the percentage of total Pakistan's population for each city (Figure 53) obtained from official data from the United Nations[5], in combination with the Pakistani population forecast cited above, the Karachi's population forecast was estimated. This data covered the period from 1980 until 2030, and from 2030 to 2050, it was considered that the growth rate would remain constant, as it would reach maturity. It was also observed that the population's growth rate for Karachi in this period could be closely approximated by a logistic curve with an initial growth rate of 3.48% (adjusted value considering historic data), a final growth rate of 2.41% (final projected growth rate for 2030), reaching maturity in 2030 and with a 20 year decrease period.

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[5] https://esa.un.org/unpd/wup/DataQuery, accessed on October 26th, 2017.

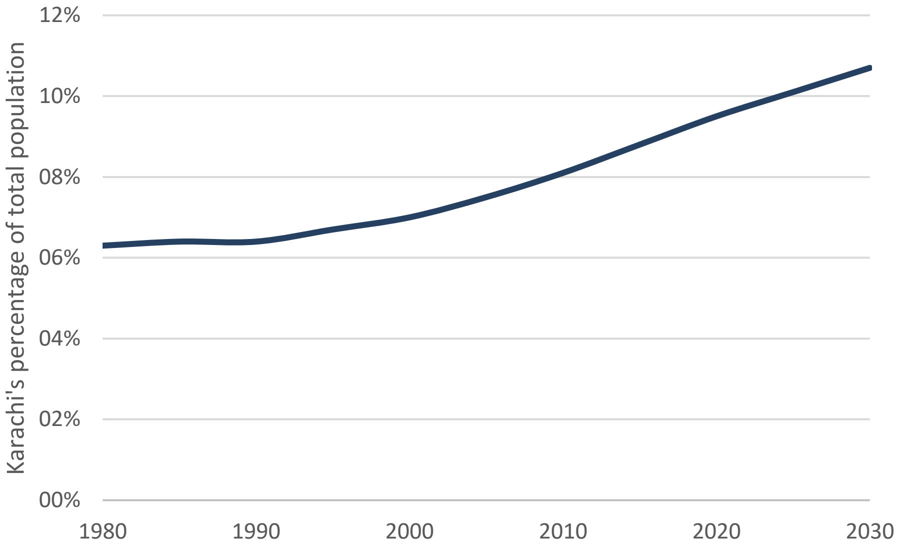

Figure 53: Karachi's percentage of Pakistan's total population

Source: UN, 2014

With data obtained from Karachi Transportation Improvement Project, the percentage of the total Karachi's population corresponding to each Union Council (UC) in the year of 2010 was derived, and it was considered that this proportion has remained the same until 2017. With this information combined with Karachi's population from the 6th Population & Housing Census-2017, which was over 16 million in 2017 (as on January 03, 2018), of the Pakistan Bureau of Statistics, the population of each UC in 2017 was estimated.

Finally, the final step would be to estimate the population growth of each modelled zone in Karachi. In order to do that, each zone was classified within the following categories, as each region is likely to have a different population growth variation along the next years:

- Region 0: Presents population growth for a long period of time due to its great potential of occupation;
- Region 1: Presents intermediary population growth due to its partially consolidated structure;
- Region 2: Represents the most consolidated region of the city, reaching growth maturity in a shorter period of time.

The criteria for this classification was based on the occupation density (for example, very dense areas are near their saturation points, and are not likely to keep growing for a long time), which was based on three density ranges. Figure 54 shows how the occupation density was measured.

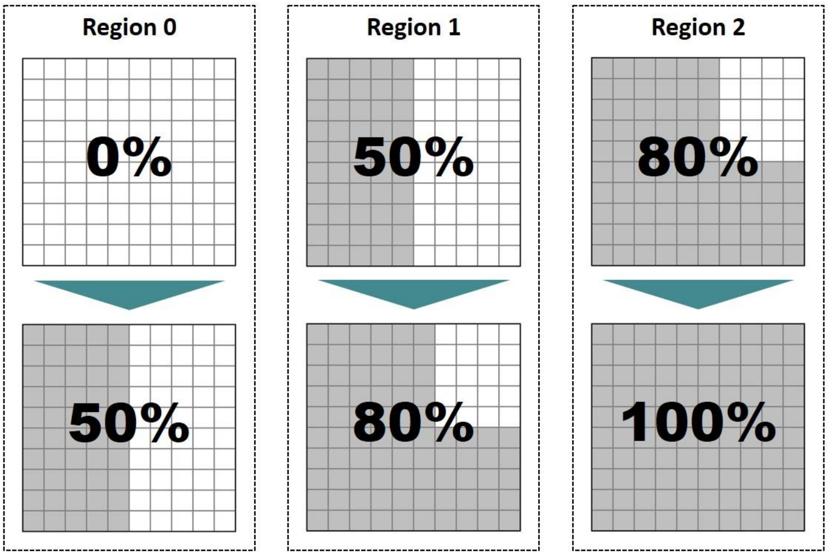

Figure 54: Population density ranges for occupancy classification

The result of this classification can be seen in Figure 55.

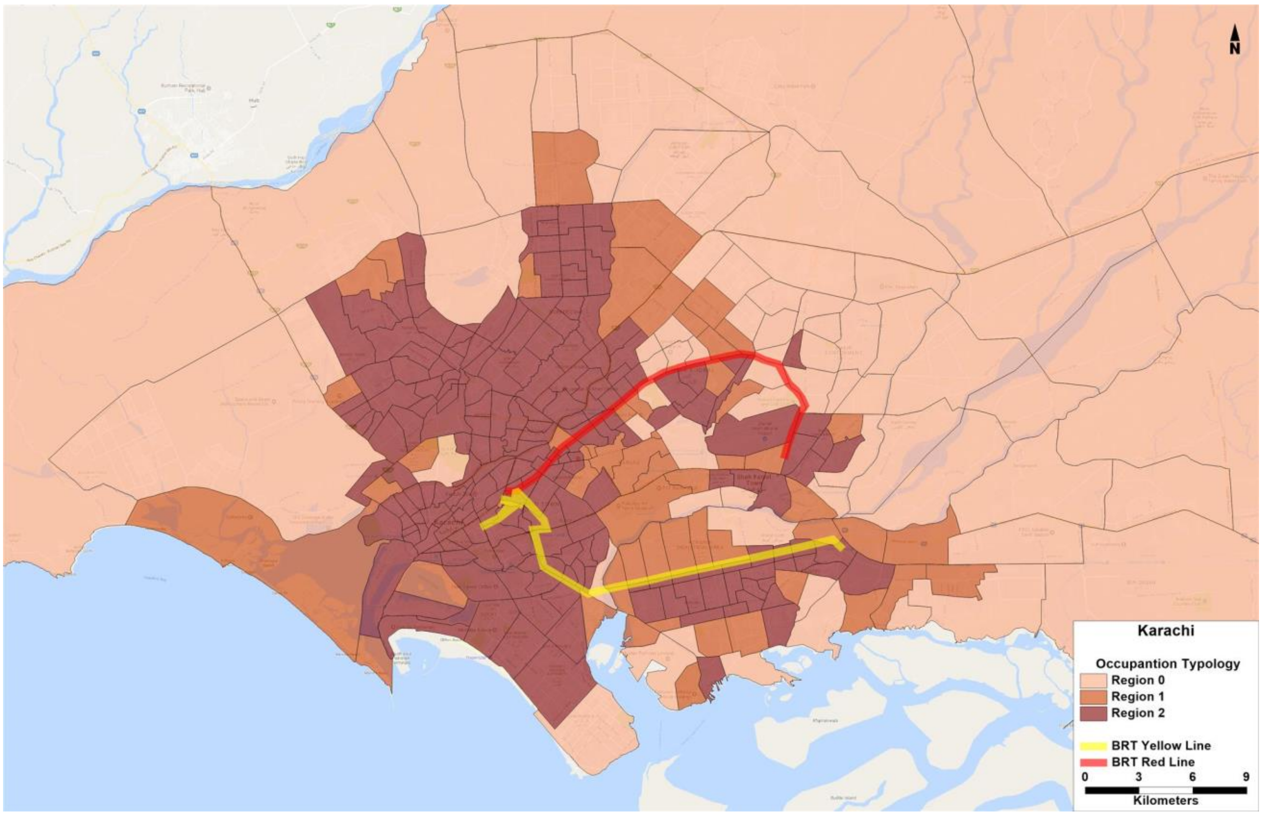

Figure 55: Zone occupancy classification

Using this information, combined with the population of each UC in the year of 2017, it was possible to estimate the population of each zone in 2017, as shown in Figure 56.

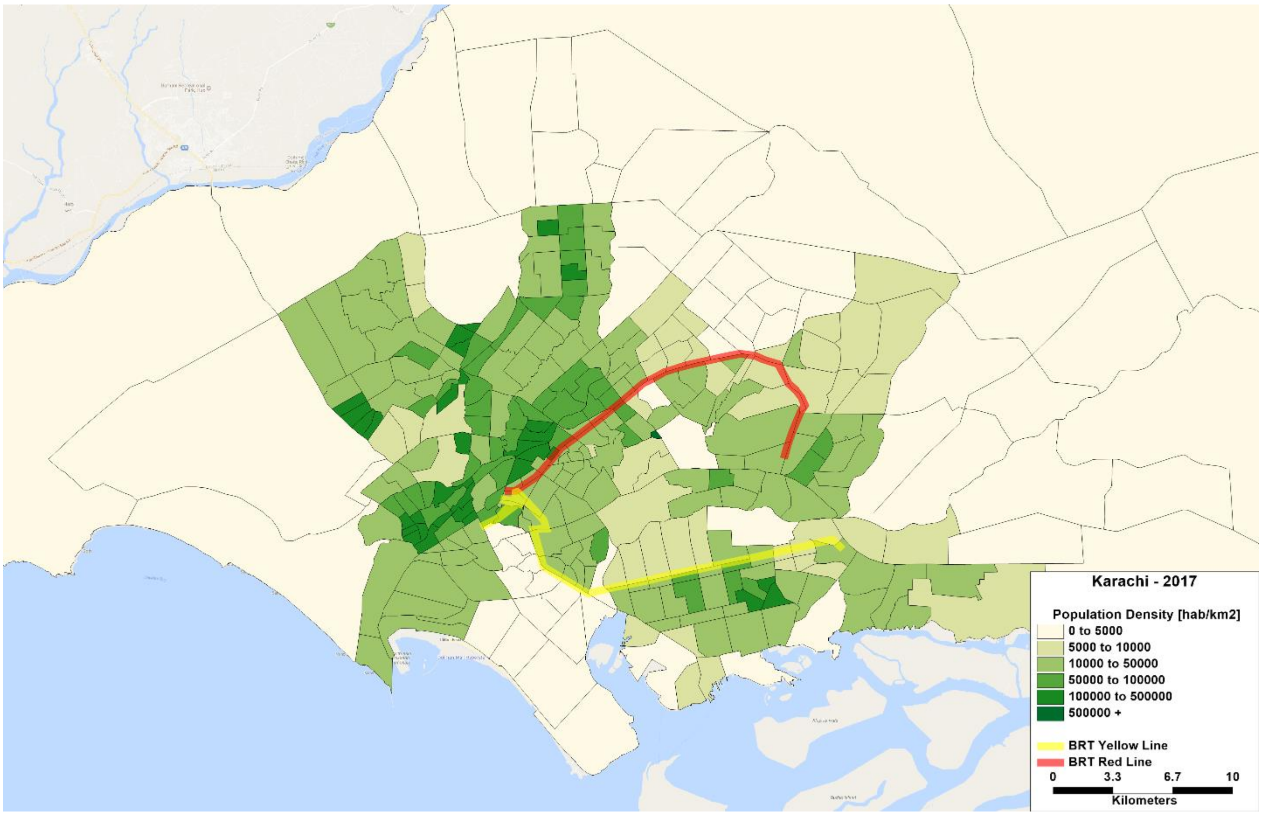

Figure 56: Estimated population density of each zone in 2017

The next step would be to forecast the population growth for each zone. Considering that Karachi's population growth could be well approximated by a logistic curve, as described above, it was considered reasonable to assume that every zone would follow a similar behaviour, therefore their growth could also be approximated by a logistic curve. As each classified region would present a different growth pattern, three different logistic curves were created to represent each region type, as seen in Figure 57. It was considered that, in order to maintain the overall Karachi's growth coherent, zones classified as Region 0 would grow more than Karachi's average and zones classified as Region 2 would grow less than that. Region 1 zones were considered to grow in the same pace as Karachi's average.

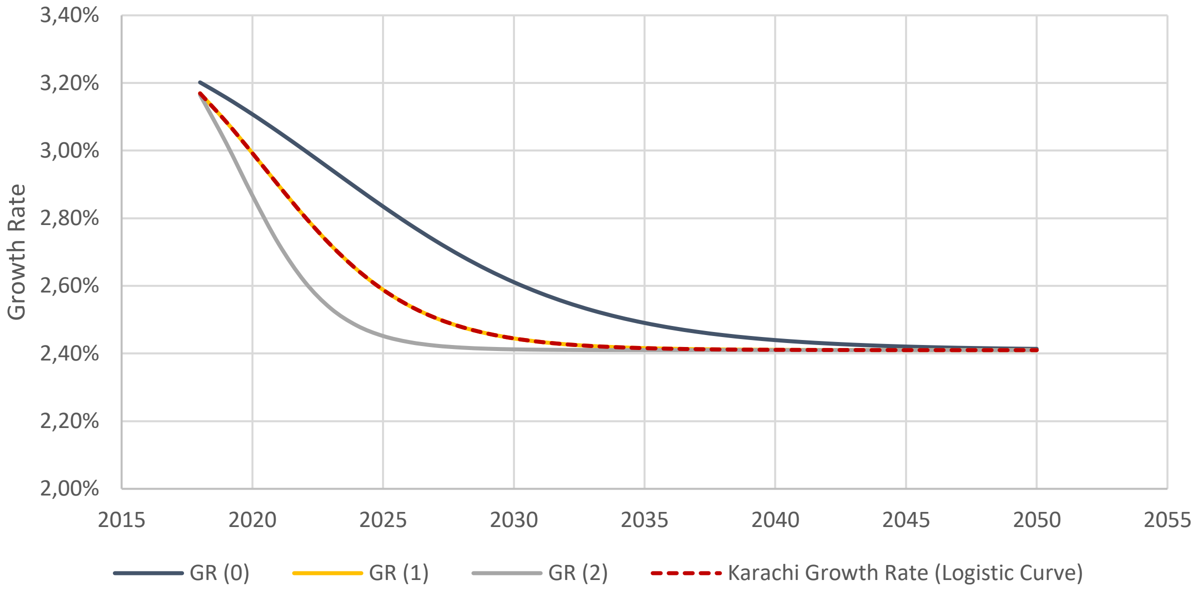

Figure 57: Logistic curve of zone's growth rate per region's classification

With these three logistic curves, it was possible to forecast each region's growth from 2018 to 2050. In order to check the consistency of this estimative, the total Karachi's population obtained in this forecast was compared with the total Karachi's population forecast based on the UN and USDA data (considered a highly reliable source). As both results were reasonably similar, the zone growth rate forecast was considered reasonable. The final step was to adjust the outputs from this forecast in a way that it would perfectly match the UN and USDA data, and all zone's populations were proportionally adjusted yearly.

Table 17 presents Karachi's total population for 2017, 2020, 2027, 2030, 2037, 2040 and 2050.

Table 17: Karachi Population Forecast

Year	Population (MM)	Growth factor
2017	16,054,988	-
2020	17,540,290	1.09
2027	20,900,645	1.30
2030	22,449,764	1.40
2037	26,522,126	1.65
2040	28,486,260	1.77
2047	33,653,637	2.10
2050	36,145,905	2.25

Figure 58 presents Karachi's forecasted population density in 2020 and in 2050.

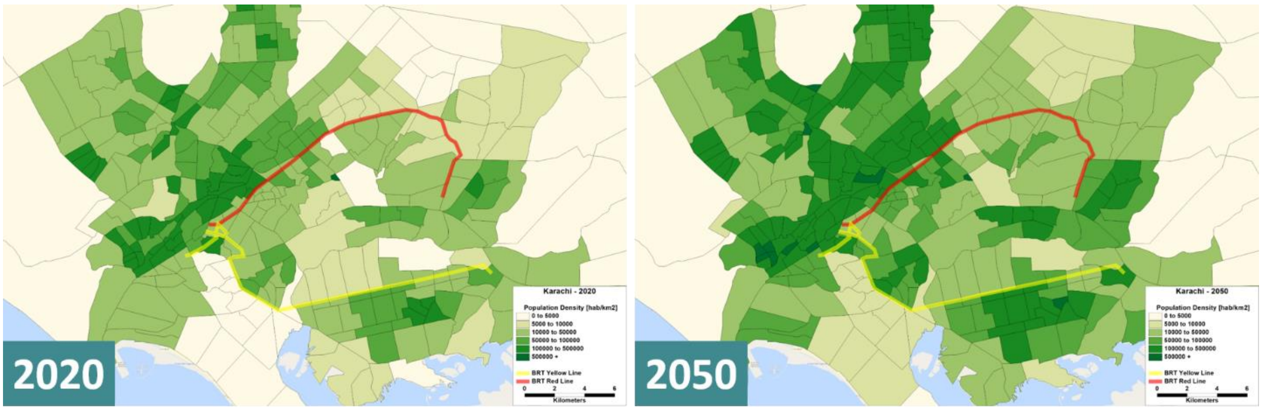

Figure 58: Population density forecast per zone (2020-2050)

The future demand for the BRT services was forecasted using the same factors shown in Table 17. That is, the demand grows by the same growth rate as the population.

It is import to highlight that all scenarios considering the BRT operations will be presented in Interim Report 2, as defined in the Term of Reference.

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUT 1.2 AND OUTPUT 4.2

FARE STRUCTURE AND POTENTIAL NON-FARE REVENUE

December 2018

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

Summary

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1. Introduction

The objective of this report is to conform and detail the fare system to be used for BRT bus operations after the introduction of the Red and Yellow Line BRT, to provide the required inputs to the design of the ticketing system, as well as to determine the likely fare and potential non-fare revenues.

This product is composed by Output 1.2 (Red Line – Fare Structure and Potential Non Fare Revenue) and Output 4.2 (Yellow Line – Fare Structure and Potential Non Fare Revenue).

2. Fare Policy

2.1 Types of Fare Structure

There is a range of fare structure options for a BRT system: free fares, flat fares, zonal fares, distance-based fares and time-based fares. For this project, the consulting group is considering three options: the flat fares, the distance-based fares and the zonal fares. The following items describe each of these options.

2.1.1 Flat Fare

The flat fare structure is the most simple and common option, in which all users pay the same price for all types of trips. The user pay the fare to access the system and can use all services without restrictions of distance and duration of the trip. However, one time out of the BRT system, the user needs to pay again to use the services.

The main advantage of this fare structure is the simplicity; it is easy for the users and easy for the operator, because the access control needs to be done only at the entries of the system. However, the price of all types of trips is the same, thus the short distance trips are more expensive than they need to be and the long distance trips are cheaper. This can increase the use of informal services, as rickshaw for short distance trips.

2.1.2 Distance-Based

In a distance-based fare structure, the fare level varies according to the distance traveled in kilometers; it means that long trips will have higher fares than short trips.

Distance-based fare structures are not usual in developing cities because the higher costs of long distance trips can inhibit access to jobs, health care and education to low-income groups. Even though, some developing cities, like Bangkok (Thailand) and Delhi (India), have implemented systems with a distance-based fare structure because of its closer relations with the operational costs.

The distance-based fare structure can provide a revenue directly proportional to the operating expenses. Therefore, as longer journeys implies on more fuel and labor, it is safer for the BRT system that these longer journeys pay higher fares.

In Karachi, city that has many informal transport services, it is important to have a competitive system with a competitive fare. Currently, it is common to use informal services to short distance trips, as rickshaw. Thus, the system with distance-based fare structure can provide a competitive fare for these short distance trips and avoid loss of demand from BRT to informal services.

Figure 2.1: Rickshaws: competitive low cost service for short trips

Source: www.pakwheels.com

2.1.3 Zonal-Based

The zonal-based fare structure is a simplified version of the distance-based fare structure. In this case, the charge is based on the zones of origin and destination of the trips. Thus, there is a different fare for each origin-destination zones pair.

The simplicity is the main advantage of this type of fare structure. The zonal-based fare structure avoids the users' confusion, because it is easier to understand the costs of a trip in a city with few zones. However, the zonal structure have some peculiarities that make short trips costs higher than long trips, as shown in the picture below.

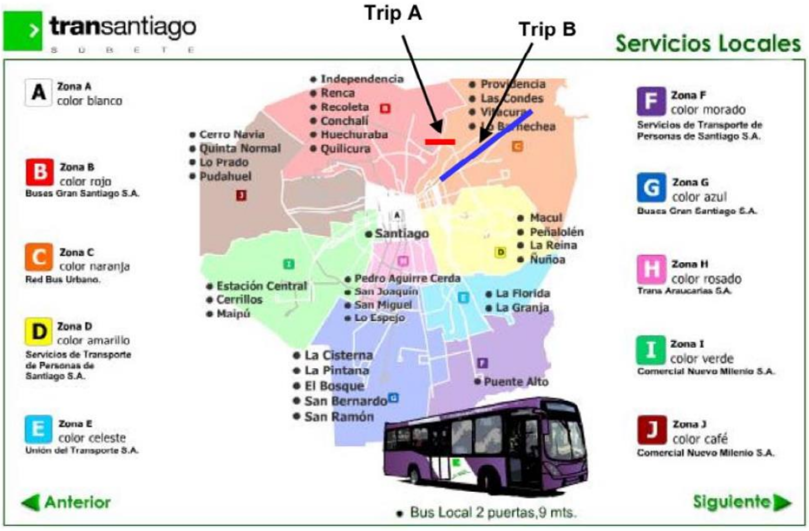
transantiago
SUBETE
Trip A
Trip B
Servicios Locales
A Zona A color blanco
B Zona B color rojo Buses Gran Santiago S.A.
C Zona C color naranja Red Bus Urbano.
D Zona D color amarillo Servicios de Transporte de Personas de Santiago S.A.
E Zona E color celeste Unión del Transporte S.A.
F Zona F color morado Servicios de Transporte de Personas de Santiago S.A.
G Zona G color azul Buses Gran Santiago S.A.
H Zona H color rosado Trans Araucarias S.A.
I Zona I color verde Comercial Nuevo Milenio S.A.
J Zona J color café Comercial Nuevo Milenio S.A.
Independencia
Renca
Recoleta
Conchalí
Huechuraba
Quilicura
Providencia
Las Condes
Vitacura
Lo Barnechea
Cerro Navia
Quinta Normal
Lo Prado
Pudahuel
Santiago
Macul
Peñalolén
La Reina
Ñuñoa
Estación Central
Cerrillos
Maipú
Pedro Aguirre Cerda
San Joaquín
San Miguel
Lo Espejo
La Florida
La Granja
La Cisterna
La Pintana
El Bosque
San Bernardo
San Ramón
Puente Alto
Anterior
Siguiente
Bus Local 2 puertas,9 mts.

Figure 2.2: TransSantiago: the short trip (A) costs more than the long trip (B)

Source: ITDP BRT Planning Guide, 2007

This feature of the charging system may encourage the increase of informal services such as rickshaws in certain parts of the system, as cheaper options for the short distance trips.

2.1.4 Collecting and Verifying the Fares

The principal disadvantage of complex fare systems, such as distance-based fares and zonal fares, is the additional costs to collect and verify the fares on the entry and on the exit of passengers at the system. Additionally, customer confusion can occur about the cost of a trip and customers may enter the system without knowing exactly how much that trip will cost.

In Karachi, it has already been working in a distance-based fare regime for the public transport routes, which can minimize the implementation problems of this type of fare structure. The only difference will be the payment method, by a smartcard system without cash payment inside the bus/stations.

The fare validation at the closed stations takes place off-board (during the entry and the exit of the stations). However, for the off-corridor boarding/alighting, fare validation needs to take place on-board. Thus, on-board fare validators will be required at the curbside doorways. Each curbside doorway will need two fare validators (one for boarding validation and other for alighting validation) and one security agent to verify/monitor the payment validation.

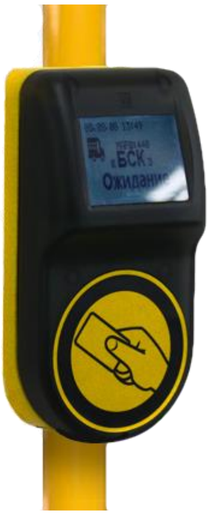

Figure 2.3: Example of on-board fare validator

Source: www.en.elsy.ru

2.1.5 Smartcard Payment

The fare payment on the new BRT system will be done by a smartcard, without the option of payment by cash. However, most future users of the system have low incomes, which makes impossible the recharge of the card in advance.

Usually, the lower income users do not have the money to pay more than two trips in advance. Because of the recharge facilities in the stations, this will not be a problem for the on-corridor users. For the others, who board and/or alight at the off-corridor stops, the recharge of the card can be done by the use of recharge cards.

The buy and sell of recharge cards can be done in any type of commercial establishment located near the stopping points or even by registered agents. Just as mobile phone companies currently do it, the cards can feature low-cost versions. In addition, the user can recharge the smartcard remotely, through a free phone call.

The use of registered agents to sell tickets for the BRT system was done by the city of Goiania (Brazil), as shown in the Figure 2.4 below. The agents were allowed to sell the system tickets near the stations, which generated jobs and stimulated the local economy.

Figure 2.4: Registered agent selling tickets near the BRT station

Source: tarifazerogoiania.wordpress.com

Another advantage of using low cost recharge cards is the reduction of the logistic cost to the system. This occurs because the registered agents can be the responsible for the sale and the transportation of the recharge cards themselves. However, it is up to the system operator to check and encourage the sale of the recharge cards near all off-corridor bus stops.

2.2 Current Fare Levels

Karachi's current public transport system is composed of Mini Buses, Large Buses and Coaches running under the same fare structure: distance based, as shown in Figure 2.5.

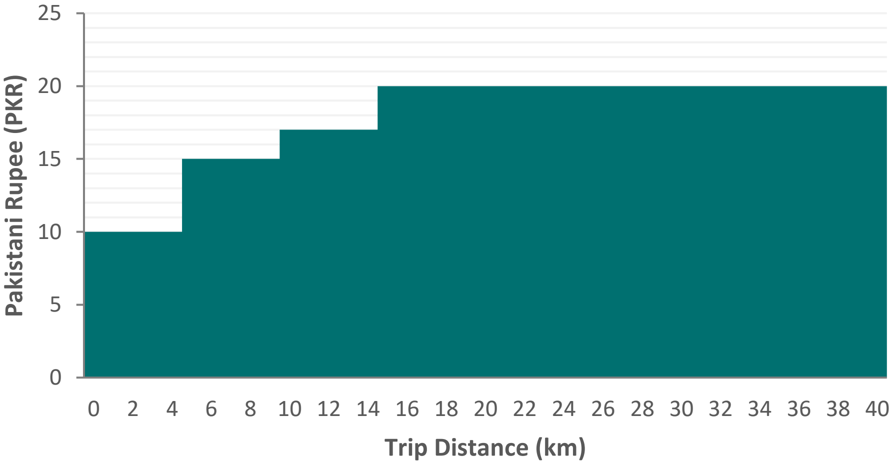

Figure 2.5: Current fare levels in Karachi

For trips with distances between 0 and 5 kilometers, the fare is fixed in 10 rupees; for trips between 5 and 10 kilometers, the fare is 15 rupees and, for trips between 15 and 20 kilometers, the fare is 17 rupees. For trips longer than 20 km, the fare is 20 rupees.

2.3 Discounted Fares

Today, Karachi experiences a massive use of individual motorized transportation, such as motorcycles and cars. This occurs because of the low marginal cost of the use of cars and motorcycles, once the passenger has sunk the investment into the procurement of the vehicle. This cost decreases the more the vehicle is used.

2.3.1 Persons Eligible

The implementation of discounted fares can act on the opposite way, transforming the public transport system into the most economical option. The discounted fares can be a good incentive to the use of the BRT system for special social groups for reasons of social equity, such as:

- Students
- Senior citizens
- Persons with disabilities

The determination of student eligibility often occurs under the possession of a valid student identification. Student discounts may be limited to only certain segments, as primary, middle, secondary or university levels.

The eligibility for a discounted fare for senior citizens bases typically on an age limit. For example, all users over 60 years old are qualified for the special discount.

The identification of the users is one of the issues that should be considered to the fare discounts implementation, to avoid other users to use the discount improperly. The formal registration and a photo identification on the smartcard can be used for a verification of the user. Agents present in the buses or in the stations can do the verification process randomly.

Another possible control mechanism is limiting the amount of travel with discount for each smartcard. This limitation prevents the use of the same smartcard repeatedly by several people.

2.3.2 Cost Recovery

In view of the financial maintenance of the system, it is desirable that the discounted fare covers at least the marginal cost of each passenger to the system. However, in many cases, this is not possible, which implies that someone pays the difference, that is, someone subsidizes the discount offered to these users.

This subsidy may either occur directly or crosssubsidized. In the direct form, the government pays to the system the value of the discount, that is, the government pays to the system to provide advantages for the citizens of these special groups.

In the cross-subsidies, the other users pay the marginal cost value of the users who have the discount. That is, the value of the general fare is greater and the marginal cost of the special users is diluted among the users who pay for the service.

However, the cross-subsidies of the discounts are not recommended for the new Karachi system. This practice can exclude from the system the most financially vulnerable users. The loss of users can be very large because of the low level of income of a large part of Karachi’s population. Thus, a small increase of the fare can greatly reduce the demand for the system and make the BRT economically inaccessible to the population that most needs travel incentives.

There also is the option that merges direct and cross-subsidies, with the government paying to the system part of the value of the discount and the other users paying the other part.

As an example, in the city of Curitiba in Brazil, cross-subsidies were used until 2013. The discounted fares were not financed by the government, causing an increase of 16% on the fares without discount. In 2013, the high fares led the population to protest. To stop the protests and to please the population, the government decided to subsidize part of the value of the discount, decreasing the fare without discount in 6%, merging cross-subsidies with direct subsidies.

Analyzing Karachi’s scenario, this consultancy strongly recommends that the government itself subsidize fare discounts. That is, the operator will receive from the government the difference between the value received (discounted fare) and the value of the non-discounted fare. The government cannot transfer this burden to the users or to the operator. To ensure equity of access and financial balance of the system, the government must pay for the discounts provided.

3. Non Fare Revenue

The system fare is not the only source of revenue. Stations, bus stops and vehicles are spaces in which the system can exploit various forms of financial collection, such as the advertising and marketing. There is also the possibility of other financial exploitation, such as the commercialization of carbon credits or the appreciation of the land value. The following items present some of these possibilities.

3.1 Advertising and Merchandising

The stations, bus stops and the BRT vehicles are spaces with high circulation of people and can be highly exploited as a source of non-fare revenues for the system. The commercial exploitation of spaces for advertising campaigns is a common practice in practically all BRT systems. The revenue of this advertising can reach up to 10% of all investment in infrastructure and rolling stock of the system.

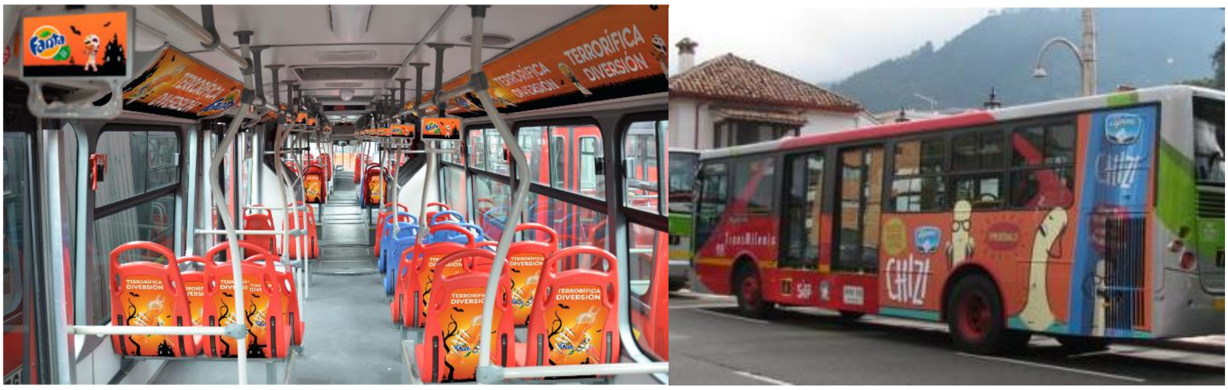

Figure 3.1: Advertising in TransMilenio buses (Bogota, Colombia)

Buses can receive advertising campaigns both externally and internally, as shown in the Figure 3.1. However, the excessive publicity can act in an unfavorable way to the system and cause negative impacts on the user's perception.

Excessive advertising within buses can cause visual discomfort and increase the user's perception of travel time. In the exterior of the vehicle, exaggerated advertisements can damage the visual language and branding of the system.

Stations and bus stops also have many spaces that can be used for advertising campaigns, as shown in the MetroBus example in Figure 3.2.

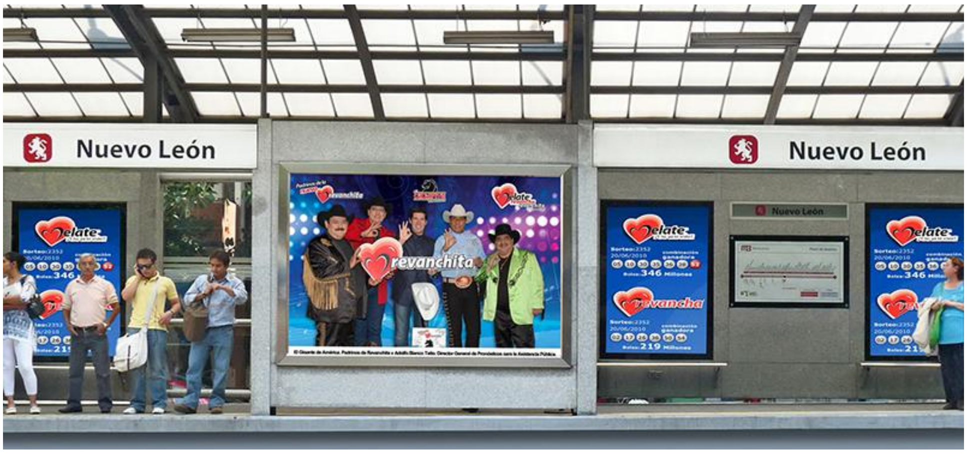

Figure 3.2: Advertising in MetroBus stations (Ciudad del México, Mexico)

However, this commercialization of the system must be done with caution because, with lots of advertisements, the customers can be less able to distinguish signage relating to the system use. In Karachi, the caution with the perception of the system signage must be an important issue, due to the unprecedented nature of a high capacity transport system in the region.

In addition, the system operator can make infrastructure maintenance or improvement agreements associated with the advertisements. Such agreements are interesting because the quality of the environment reflects how the user perceives the advertising message, as shown in the Figure 3.3. Thus, the advertising company has an incentive to maintain and improve the infrastructure and/or the buses of the BRT system.

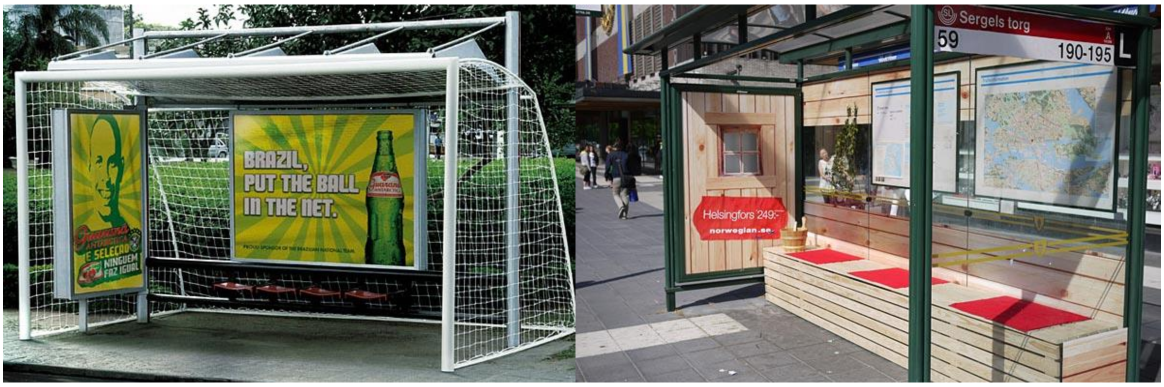

Figure 3.3: Private interventions on the bus stops user's perception in Brazil and Sweden

Another source of non-fare revenue can be the commercialization of the BRT brand, that is, the commercialization of products with the visual language and the brand of the system, referring to the good experience of traveling in the new buses. One of the world's best examples of this practice is the London Underground, as shown in the Figure 3.4 below.

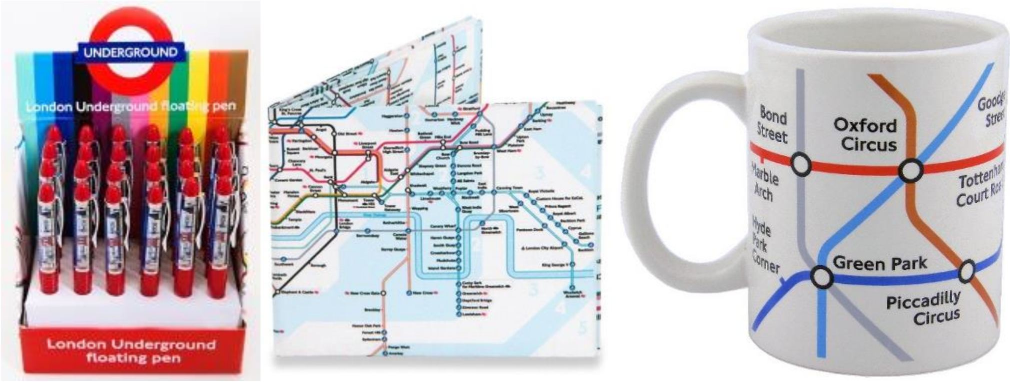

Figure 3.4: Merchandising products offered by London Underground

The revenues obtained are usually small in relation to other possibilities. However, these products have a great advantage: contributing to the popularization and acceptance of the system brand by the local population. In the case of Karachi, the products can support the sense of pride of the local population in relation to the quality service that the city now offers to the citizens.

When the acceptance of the system and the products is high, a problem can arise: the marketing of pirated products. This problem occurred quickly in TransMilenio (Bogota, Colombia) and MetroBus (Ciudad del Mexico, Mexico), as shown in the Figure 3.5. Pirated products are generally inferior in quality to official products and this perception may be associated with the BRT brand.

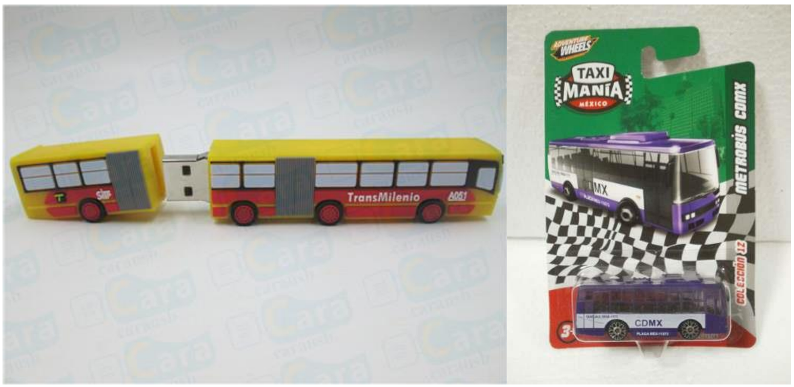

Figure 3.5: Pirated products of Transmilenio (Bogota, Colombia) and MetroBus (Ciudad del Mexico, Mexico)

In order to estimate the potential revenue from advertising and merchandising that could be explored in the system, it was performed an evaluation per station as presented in the following tables.

Table 3.1: Assumptions for available advertising space in stations

Quantity	Location	Screen Size	Square feet	Total square feet	Total square meters
2	Inside Walls	20ft x 5ft	100	200	18.59
6	Inside Walls	6ft x 4ft	24	144	13.38

Quantity	Location	Screen Size	Square feet	Total square feet	Total square meters
2	Inside Walls	5ft x 15ft	75	150	13.94
12	Inside Walls	5ft x 12ft	60	720	66.91
2	Inside Wall of the Elevator	1ft x 3ft	3	6	0.56
2	Opening door of the elevator	1ft x 3ft	3	6	0.56
4	Elevators	5ft x 25ft	125	500	46.47
2	Escalators	Steps and Sidewalls	50	100	9.29
8	Pedestrian Bridges (Outside)	3ft x 3ft	9	72	6.69
Total advertising space				**1,898**	**176.39**

Source: ODBM market survey

Table 3.2: Station advertising revenue estimative – Red Line

ID	Station Name	Type	Advertisement Space (sqft)	Avg. Monthly Rental (PKR/Month/sqft)	Monthly Revenue (PKR/Month)	Yearly Revenue (PKR/Year)
RL-00	Khudadad Colony	Staggered elevated	1,898	749	1,420,840	17,050,078
RL-01	Islamia College	Staggered at grade	1,898	567	1,076,445	12,917,334
RL-02	Usmania Park	Nonstaggered at grade	1,898	567	1,076,445	12,917,334
RL-03	Jail Chowrangi	Staggered at grade	1,898	749	1,420,840	17,050,078
RL-04	Faizan e Madina	Staggered at grade	1,898	749	1,420,840	17,050,078
RL-05	Civic Centre	Staggered at grade	1,898	749	1,420,840	17,050,078
RL-06	Expo Centre	Staggered at grade	1,898	749	1,420,840	17,050,078
RL-07	Bait ul Mukaram	Staggered at grade	1,898	749	1,420,840	17,050,078
RL-08	Urdu University	Staggered at grade	1,898	749	1,420,840	17,050,078
RL-09	NIPA	Nonstaggered at grade	1,898	749	1,420,840	17,050,078
RL-10	Metro	Nonstaggered at grade	1,898	749	1,420,840	17,050,078
RL-11	Safari Park	Nonstaggered at grade	1,898	749	1,420,840	17,050,078
RL-12	NED University	Nonstaggered at grade	1,898	567	1,076,445	12,917,334
RL-13	Karachi University	Nonstaggered at grade	1,898	567	1,076,445	12,917,334
RL-14	Sheikh Zayed Islamic Centre	Nonstaggered at grade	1,898	567	1,076,445	12,917,334
RL-15	Mosmiat	Nonstaggered at grade	1,898	567	1,076,445	12,917,334
RL-16	Johar Complex	Nonstaggered at grade	1,898	567	1,076,445	12,917,334

ID	Station Name	Type	Advertisement Space (sqft)	Avg. Monthly Rental (PKR/Month/sqft)	Monthly Revenue (PKR/Month)	Yearly Revenue (PKR/Year)
RL-17	Safoora	Staggered at grade	1,898	567	1,076,445	12,917,334
RL-18	Race Course	Nonstaggered at grade	1,898	262	497,458	5,969,495
RL-19	Check Post 6	Staggered at grade	1,898	262	497,458	5,969,495
RL-20	Acacia Golf Club	Staggered at grade	1,898	262	497,458	5,969,495
RL-21	Tank Chowk	Nonstaggered underground	1,898	262	497,458	5,969,495
RL-22	Model Colony	Staggered at grade	1,898	262	497,458	5,969,495
RL-23	Malir Halt	Nonstaggered at grade	1,898	262	497,458	5,969,495
				Total	**25,804,702**	**309,656,421**

Source: ODBM market survey

In summary, it is estimated that the system will generate a total of approximately 25,800,000 PKR per month from advertising and merchandising revenue. This amount will be directed to the future TransKarachi company. There will also be a share of the advertising revenue that will be directed to the vehicle operator, which is the revenue due to advertising inside the vehicles, and this revenue is estimated in the following tables.

Table 3.3: Estimative for available advertising area in buses

				Units			**Area (m2)**		
		Units		**9-m**	**12-m**	**18-m**	**9-m**	**12-m**	**18-m**
External	Rear	2.00	m2 per bus	1.00	1.00	0.50	2.00	2.00	1.00
Internal	Grab holders	0.01	m2 per unit	23.00	30.00	45.00	0.24	0.31	0.47
	Advertisements holders	0.25	m2 per unit	4.00	5.00	8.00	1.00	1.25	2.00
	Rear wall	2.00	m2 per bus	1.00	1.00	0.50	2.00	2.00	1.00
	Partition walls	0.24	m2 per unit side	16.00	16.00	17.00	3.84	3.84	4.08
				Total area per bus (m2)			9.08	9.40	8.55

Source: ODBM market survey

Table 3.4: Estimative for advertising revenue for vehicle operator – Red Line

No.	Size	No. of Buses*	Space Available for Rental (Sqm)	Monthly Rental (PKR/bus/month)	Monthly Revenue (PKR/Month)	Yearly Revenue (PKR/Year)
1	9m	41	9.08	125,000	5,125,000	61,500,000
2	12m	199	9.40	125,000	24,875,000	298,500,000
3	18m	56	8.55	125,000	7,000,000	84,000,000
				Total	37,000,000	444,000,000

** Preliminary bus fleet estimative for Red Line*

Source: ODBM market survey

It should be noted that the vehicle operator advertising revenue varies with the total number of vehicles in the fleet.

3.2 Sales or Leasing of Commercial Space Near Stations

The commercial concession of commercial spaces near or in the stations is a common practice to obtain non-fare revenues for the system. These revenues can be used to pay part of the initial investment or the operational costs of the system. In some cases, the revenue from commercial spaces at the station may pay for an entire station.

According to the conceptual design presented for the stations and terminals, there are many spaces determined for this commercial exploitation on Karachi BRT, such as walkways and circulation areas. There are two alternatives for these spaces: the rent or the sale of the commercial spaces to private investors.

The most commonly used option is the rent. It gives greater flexibility to the system in the future, allowing eventual system extensions, stations changes and the reallocation of the commercial areas. In addition, the system tends to grow, increasing the demand of the stations and the circulation of people. Thus, the operating company can adjust the rent value for the commercial spaces and increase the revenues.

In order to estimate the commercial revenue that the system could generate, an evaluation considering the potential commercial revenue on stations was performed and is presented in the following table.

Table 3.5: Commercial revenue on stations estimative – Red Line

ID	Station Name	Type	Space Available for Commercial Activity (sqm)	Monthly Rental (PKR/Month/sqm)	Monthly Revenue (PKR/Month)	Yearly Revenue (PKR/Year)
CC-01	Numaish	Nonstaggered underground	21,677	1,614	34,987,200	419,846,400
RL-00	Khudadad Colony	Staggered elevated	945	1,076	1,016,820	12,201,840
RL-04	Faizan e Madina	Staggered at grade	250	1,076	269,000	3,228,000
RL-05	Civic Centre	Staggered at grade	250	1,076	269,000	3,228,000
RL-06	Expo Centre	Staggered at grade	400	1,076	430,400	5,164,800
RL-07	Bait ul Mukaram	Staggered at grade	365	1,076	392,740	4,712,880

ID	Station Name	Type	Space Available for Commercial Activity (sqm)	Monthly Rental (PKR/Month/sqm)	Monthly Revenue (PKR/Month)	Yearly Revenue (PKR/Year)
RL-08	Urdu University	Staggered at grade	240	1,076	258,240	3,098,880
RL-09	NIPA	Nonstaggered at grade	350	1,076	376,600	4,519,200
RL-10	Metro	Nonstaggered at grade	445	1,076	478,820	5,745,840
RL-11	Safari Park	Nonstaggered at grade	400	1,076	430,400	5,164,800
RL-12	NED University	Nonstaggered at grade	750	1,076	807,000	9,684,000
RL-13	Karachi University	Nonstaggered at grade	875	1,076	941,500	11,298,000
RL-15	Mosmiat	Nonstaggered at grade	450	1,076	484,200	5,810,400
RL-16	Johar Complex	Nonstaggered at grade	450	1,076	484,200	5,810,400
RL-17	Safoora	Staggered at grade	745	1,076	801,620	9,619,440
Total					**42,427,740**	**509,132,880**

Source: ODBM market survey

In summary, it is estimated that the system will generate approximately 42,400,000 PKR per month from commercial revenue.

3.3 Land Value Taxation

Most public transportation system projects do not include, in their financial planning, the valuation of the adjacent lands. In many cases, private individuals and companies reap large benefits based on the public investments in urban infrastructure.

Land Value Taxation (LVT) is one way to reverse this land valorization in source of income for the system or even to finance the public investments. LVT is a land tax annually applied on the city land on the local benefits provided by the urban infrastructure.

LVT concept suggests application of the taxation directly only to the land, not including the infrastructures and buildings added. That is, the tax basis is only the land value. Therefore, if the land value increases because of a BRT corridor (or other infrastructure), the value charged also increases. This concept makes LVT as an increasingly recognized revenue-generating mechanism that can help public sector to pay for new transportation systems or other urban infrastructures.

Besides the contribution to investments financing, LVT presents many other benefits for the urban development. It is an incentive for the owner to make best use of the land and maximize the use of lands with good urban infrastructure. The tax returns to the community the value that the community itself has created and it is generally a low-cost and simple tax to implement.

3.4 Telecommunication Rights

The implementation of a BRT system requires several works and changes in the local infrastructure focusing in the main axes of the city. Therefore, it is a propitious time to other infrastructure improvements, such as road drainage, water supply pipes, basic sanitation and others. One of the systems that may have interest in these improvements is the telecommunications industry, as it can take advantage and install new cabling or even begin to provide services that were previously unfeasible.

The system can make concessions of the BRT underground area to the implementation of new technologies, such as fiber optic systems. However, the planning of the telecommunication infrastructure must be in close association with the BRT infrastructure. The position of the cable must have an easy access for repair work and not be placed underneath a bus lane, to avoid possible interferences on the BRT operation.

Another possibility is the concession of the Wi-Fi network provision in the BRT buses and stations. Thus, the telecommunication company can provide a free Wi-Fi to the system users in exchange of advertising and marketing its own products, which will ensure a good quality internet network available for all users.

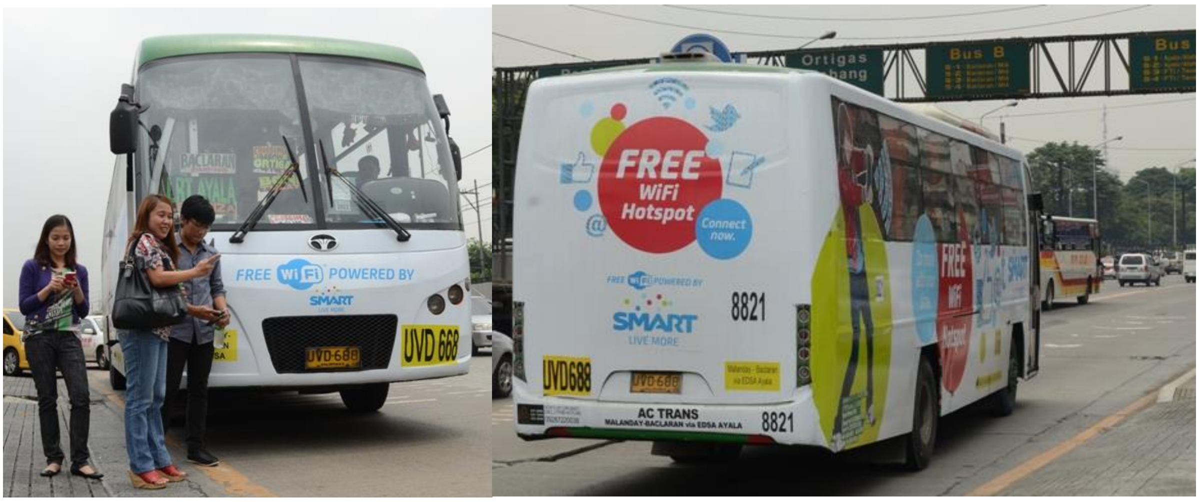

Figure 3.6: Wi-Fi powered by Smart on buses (Manila, Philippines)

Source: http://smart.com.ph/

3.5 Emissions Trading

In 1997, the members of the United Nations signed the Kyoto Protocol, an agreement to reduce global emissions. To help countries meet their targets, the Protocol included three so-called flexible market based mechanisms: international emissions trading (IET), the clean development mechanism (CDM) and joint implementation (JI).

The CDM provides a standardized emissions offset instrument called certified emission reduction (CER). Each CER refers to the reduction of one carbon equivalent ton. Under this mechanism, emission-reduction projects in developing countries can earn a CER for each ton of CO2 reduced. Countries with an emission reduction or limitation commitment under the Protocol can use these CERs to meet a part of that commitment.

This agreement implemented the commercialization of the investments in projects that reduce the carbon emissions. This commercialization takes place through certificates of investment in carbon reduction projects, called carbon emission credits.

After the Kyoto Protocol (2005), there was a worldwide enthusiasm with this emissions trading mechanism and many sustainable projects around the world got investors. However, without new commitments to reduce emissions after 2012, the regulated carbon market declined. The value of each CERs, which was quoted around € 20 during the carbon market peak, went to € 0.5 in 2015.

So, many of the projects have been redirected to a voluntary market, in which the emission reductions are attested by non-governmental organizations and acquired by companies that want to voluntarily compensate their emissions.

In addition, there is a few number of approved methodologies for measuring the emission reductions, which increases the costs of the projects due to high sophistication requirements. Other issue is the low financial viability of the transport infrastructure projects because of the gap between the cost/investments and the revenues. Today, the investors of the carbon market prefer smaller sized projects that return faster and demand lower investments.

Despite these presented findings, the use of carbon credits is still possible for negotiations with alternative mechanisms to Kyoto such as the Chicago Climate Exchange (CCX), the Regional Greenhouse Gas Initiative (RGGI), California AB 32, California Carbon Allowance, among others. Therefore, the impacts of this carbon credits trading on the BRT system will be evaluated in the financial model.

3.6 Parking facilities

The experience regarding implementation of a new transport system in cities all over the world says that migration from private vehicles to public transport vehicles takes time, as the population have their own time to get used to this new system. Several factors impact on the decision of a person to do this migration, such as level of service, travel time, reliability, etc.

Parking facilities then becomes a huge tool in this process, since they allow new users to remain with private vehicles in a portion of the trip, getting public transportation for the rest of the trip when it is the case. In addition, even in environments where this migration is mature and well consolidated, several users take advantage of this parking services, since it allows them to have a faster overall trip door-to-door.

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUT 1.3 - RED LINE - FINANCIAL MODELLING OF FUTURE BRT OPERATIONS

May 2019

LOGIT

AEBEL

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

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Annex A – Red Line Revenues and OPEX Summary 18

1. Introduction

This report is divided in seven chapters that assist the reader to better understand how the model was elaborated and how it works. The chapters are as following:

1. Introduction
2. Current Status of the Financial Model
3. Purpose of the Financial Model
4. Function of the Financial Model and Dashboard
5. Structure and Contents of the Financial Model
6. Costs, Revenues and Results of the Financial Model
7. Annex A – Red Line Revenues and OPEX Summary

Chapter 2 summarizes the factors that were considered when creating the model and the functional areas encompassed by it, while Chapter 3 informs the reader about the degree to which the system costs and revenues 'balance' and the appropriate levels of service provider revenues at which the entities can cover their costs and achieve the target cash flow margin.

The model dashboard, evaluated scenarios, optimization process comprised by the model and the various factors that drive the cash flows of the service providers is explained in Function of the Financial Model and Dashboard. Chapter 5 details the structure of the model and the principles and characteristics of the methodology used, and the last chapter describes all the operational cost, revenues and financial results of the model. Finally, Annex A summarizes the breakdown of the revenues and costs of the financial model for each of the evaluated scenarios.

2. Current Status of the Financial Model

The financial model built is to help support decision making on the service offering and business planning of the Karachi BRT Project. The model takes into account all capital costs, operating costs and revenues relevant to the establishment and implementation of the envisaged BRT service.

The current model version encompasses projections for the following 'functional' areas:

- BRT vehicle operations;
- Automated fare collection supply, installation and operation;
- Intelligent Transport System (ITS) supply, installation and operation;
- Station furnishing and management;
- Fund management of fare revenue funds collected; and
- Operating overheads of TransKarachi

The current status of the model is version 01r. It is complete based on the information made available to us. This is a working version of the model, which will be used actively in optimisation of the service and business planning aspects of the ODBM scope. The model was refined from the original version to:

(1) align costs within the local context of the project;
(2) align AFC and ITS capital costs with the operational parameters; and
(3) include additional fare structure scenarios and operational (bus types and configurations) scenarios.

The Karachi BRT Project financial model can be found in Appendix A.1 – Financial Model.

3. Purpose of the Financial Model

The purpose of the financial model is two-fold:

- To inform the degree to which the system costs and revenues 'balance'. The model provides an outlook on the full system fare revenue collected, and if it is sufficient enough to cover the operational costs related to the BRT Vehicle Operating Company, System Control Service Provider and TransKarachi.
- To inform the appropriate levels of service provider revenues at which the entities can cover their costs and achieve the target cash flow margin. The model provides the required bus-kilometre charges for the BRT Vehicle Operating Company and the availability payments for the System Control Service Provider.

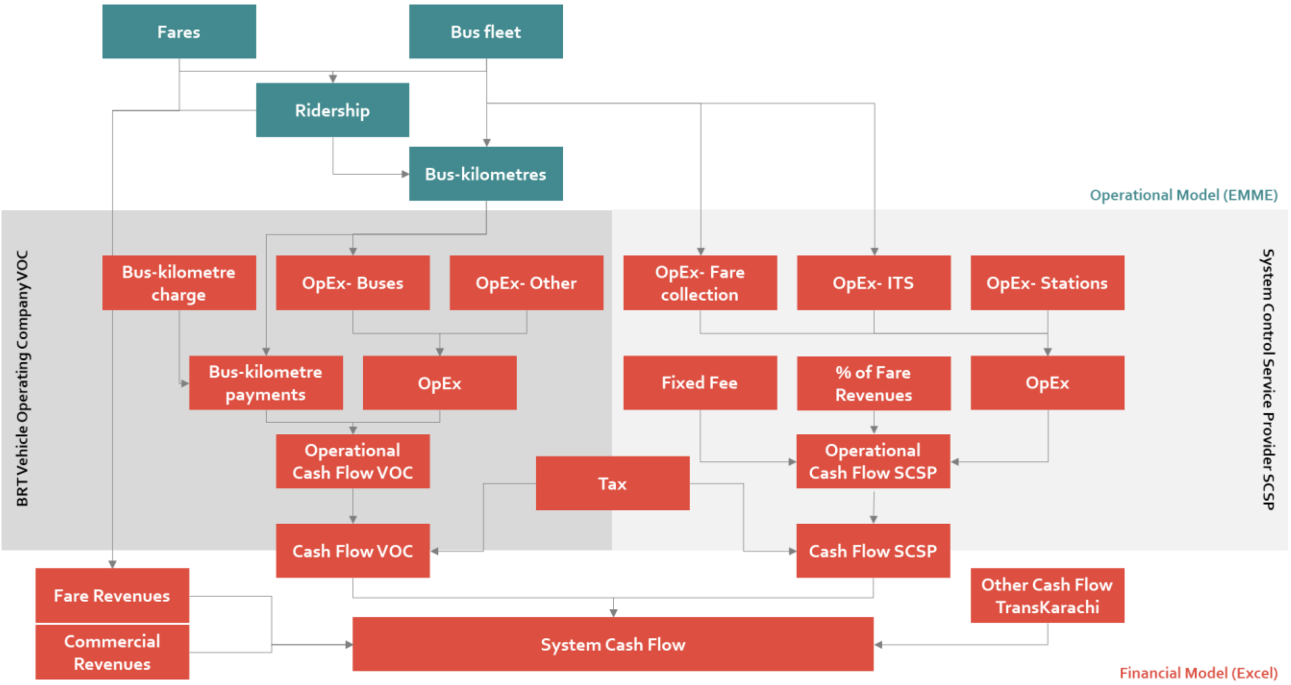
This purpose has specific relevance to tender proceedings wherein the procuring authority needs to make sense of pricing by bidders – either before bid submission (e.g. by setting minimum or maximum prices, even if not communicated to bidders) or after bid submission (e.g. in order to assess whether pricing submitted by bidders can be considered adequate to qualify as 'realistic' business planning).

The structure of relevant entities has been based on the business model report and includes:

- BRT Vehicle Operating Company (VOC): The VOC is responsible for the operation and management of the buses. For modelling purposes, the VOC has been treated as a single entity. There are 2 financing scenarios included in the model: (1) capital expenditures borne by the VOC and (2) capital expenditures borne directly by the entity, as it is presumed to be covered separately from ADB-financed milestone payments
- System Control Service Provider (SCSP): The System Control Service Provider is a single operator providing equipment and services for automated fare collection, ITS and station management. Capital expenditures related to the services are borne by the operator.
- TransKarachi and Fund Manager: Overhead costs related to TransKarachi's organisational expenses including presumed fund management costs (i.e. fees charged by a financial institution for management of the fare revenue electronic money "float account").

4. Function of the Financial Model and Dashboard

The figure below depicts the various factors that drive the cash flows of the service providers. The financial model has been tested with the operational model and has been optimised accordingly.



The arithmetic functioning of the model reflects the above described model purpose and logic. For every entity, it calculates costs, and therefrom it determines the revenues needed to cover those costs and earn a return on capital invested and risk incurred.

This is done through an optimisation routine which comprises of the following consecutive functions:

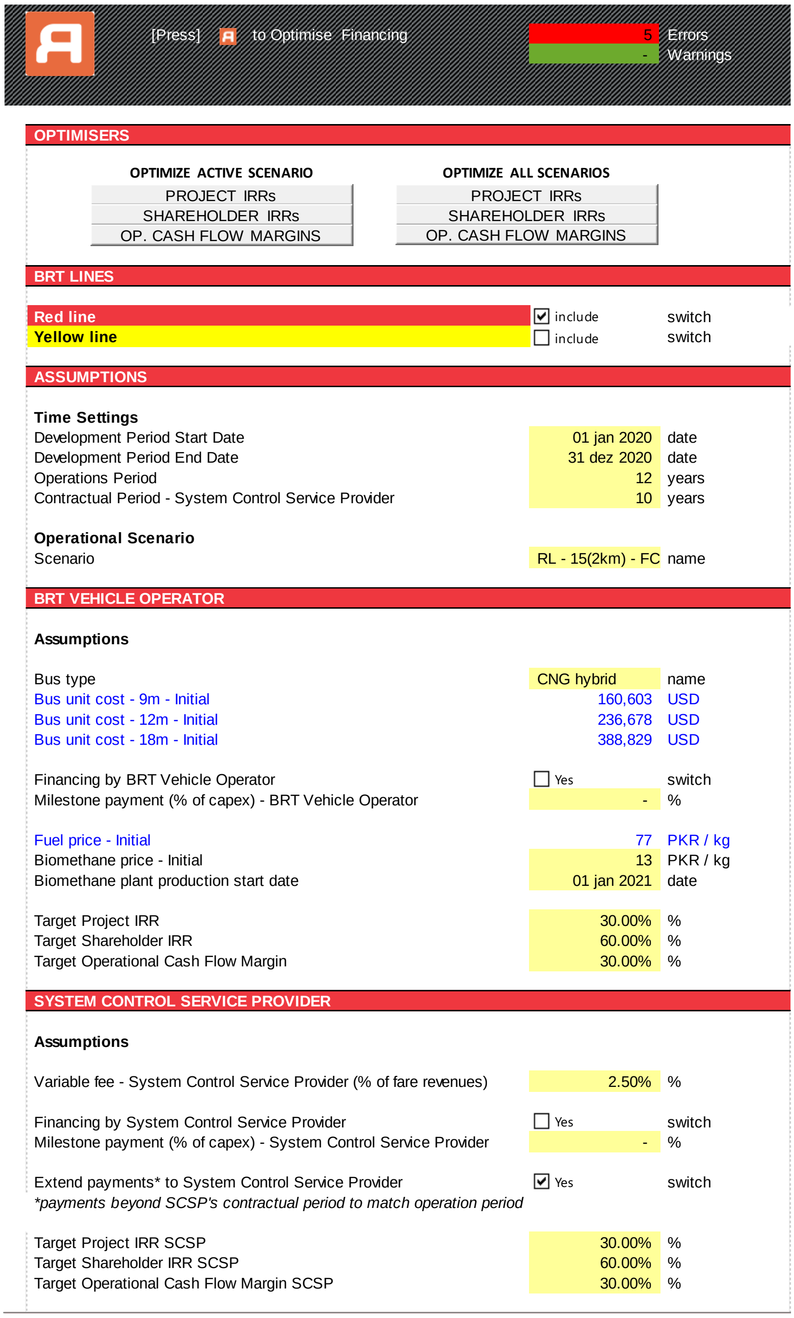
- Optimisation of the business case of VOC 9m-bus service: determines a kilometre-based fee for 9m-bus vehicle operations such that the operational costs are covered and the target operational cash flow margin is achieved.
- Optimisation of the business case of VOC 12m-bus service: determines a kilometre-based fee for 12m-bus vehicle operations such that the operational costs are covered and the target operational cash flow margin is achieved.
- Optimisation of the business case of VOC 18m-bus service: determines a kilometre-based fee for 18m-bus vehicle operations such that the operational costs are covered and the target operational cash flow margin is achieved.
- Optimisation of fixed-cost business case of SCSP: determines a fixed periodic service payment based on the variable service payment input such that the SCSP's fixed costs are covered by those fixed payments received by it.

The optimisation routine is triggered by the optimisation button included in the model dashboard. The optimisation can be done for the active operating scenario and for all operational scenarios. Subsequent to running this optimisation routine, the model dashboard displays the resulting fees and the financial balance of the overall system as a function of the level of fare revenue generated, service provider payments projected and TransKarachi running costs projected.

The model dashboard as illustrated below, in the current base case, displays the following salient outcomes:

- First year of service fare revenue collected;
- First year of service commercial revenue projections on stations;
- First year of service VOC bus-kilometre payments;

- First year of service SCSP payments;
- First year of service fund management payments;
- First year of service TransKarachi running costs
- First year of service ‘balance’ of system cash flows; and
- TransKarachi’s net operating cash flow for the entire operational period.



🟥	5	Errors
🟩	-	Warnings

OPTIMISERS

OPTIMIZE ACTIVE SCENARIO	OPTIMIZE ALL SCENARIOS
PROJECT IRRs	PROJECT IRRs
SHAREHOLDER IRRs	SHAREHOLDER IRRs
OP. CASH FLOW MARGINS	OP. CASH FLOW MARGINS

BRT LINES

Red line	☑ include	switch
Yellow line	☐ include	switch

ASSUMPTIONS

Time Settings

Development Period Start Date	01 jan 2020	date
Development Period End Date	31 dez 2020	date
Operations Period	12	years
Contractual Period - System Control Service Provider	10	years

Operational Scenario

Scenario	RL - 15(2km) - FC	name

BRT VEHICLE OPERATOR

Assumptions

Bus type	CNG hybrid	name
Bus unit cost - 9m - Initial	160,603	USD
Bus unit cost - 12m - Initial	236,678	USD
Bus unit cost - 18m - Initial	388,829	USD
Financing by BRT Vehicle Operator	☐ Yes	switch
Milestone payment (% of capex) - BRT Vehicle Operator	-	%
Fuel price - Initial	77	PKR / kg
Biomethane price - Initial	13	PKR / kg
Biomethane plant production start date	01 jan 2021	date
Target Project IRR	30.00%	%
Target Shareholder IRR	60.00%	%
Target Operational Cash Flow Margin	30.00%	%

SYSTEM CONTROL SERVICE PROVIDER

Assumptions

Variable fee - System Control Service Provider (% of fare revenues)	2.50%	%
Financing by System Control Service Provider	☐ Yes	switch
Milestone payment (% of capex) - System Control Service Provider	-	%
Extend payments* to System Control Service Provider	☑ Yes	switch
payments beyond SCSP's contractual period to match operation period		
Target Project IRR SCSP	30.00%	%
Target Shareholder IRR SCSP	60.00%	%
Target Operational Cash Flow Margin SCSP	30.00%	%

The dashboard section preceding model outcomes displays the BRT operational scenarios, described below. These are based on the transport modelling in terms of passengers per day, fleet requirements and vehicle-kilometres per day.

For the financial model, there were six different scenarios evaluated based on combinations of different premises for:

- Route plan

Several route plans were evaluated during the decision making process, and the one presented in Interim Report 2 - Appendix B, is the result of the optimization process.

- Fare Structure (FS)

Higher and lower fare structures were evaluated for a better understanding of the population behaviour when facing different BRT costs

- Fleet composition (FC)

The analysis considered 9m, 12m and 18m buses to be used in the different services for the Red Line, and the combinations presented in this report are the result of this process

All the premises above are explained in detail in the Appendix B (Output 1.4) of Interim Report 2. The following table summarizes the premises for each of the evaluated scenarios.

Table 4.1: Evaluated Scenarios

Scenario	Fare Structure (FS)	Fleet Composition (FC)
RL – FS 15(2km) - FC 1	15-55 PKR with 5 PKR increment every 2km	Trunk Services: 18 m Direct Services (except Direct 03): 12m Direct Service 03: 9m
RL – FS 15(2km) - FC 2	15-55 PKR with 5 PKR increment every 2km	Trunk Services: 18 m Direct Services: 12m
RL – FS 10(5km) - FC 1	10-40 PKR with 5 PKR increment every 5km	Trunk Services: 18 m Direct Services (except Direct 03): 12m Direct Service 03: 9m
RL – FS 10(5km) - FC 2	10-40 PKR with 5 PKR increment every 5km	Trunk Services: 18 m Direct Services: 12m
RL – FS 20(5km) - FC 1	20-50 PKR with 5 PKR increment every 5km	Trunk Services: 18 m Direct Services (except Direct 03): 12m Direct Service 03: 9m
RL – FS 20(5km) - FC 2	20-50 PKR with 5 PKR increment every 5km	Trunk Services: 18 m Direct Services: 12m

OPERATIONAL SCENARIOS

Operational scenario	**ACTIVE**		**RL - FS 15(2km) - FC 1**	**RL - FS 15(2km) - FC 2**	**RL - FS 10(5km) - FC 1**	**RL - FS 10(5km) - FC 2**	**RL - FS 20(5km) - FC 1**	**RL - FS 20(5km) - FC 2**
Annual fare revenues	2,232	PKR million	2,563	2,563	1,852	1,852	2,232	2,232
Daily ridership - Red Line Operator 1	435,633	pax	407,292	407,292	606,906	606,906	435,633	435,633
Daily ridership - Red Line Operator 2	-	pax	-	-	-	-	-	-
Daily ridership - Yellow Line Operator 1	-	pax	-	-	-	-	-	-
Daily ridership - Yellow Line Operator 2	-	pax	-	-	-	-	-	-
Operational fleet - 9m buses - Red Line Operator 1	-	buses	33	-	49	-	41	-
Operational fleet - 9m buses - Red Line Operator 2	-	buses	-	-	-	-	-	-
Operational fleet - 12m buses - Red Line Operator 1	138	buses	105	127	169	202	110	138
Operational fleet - 12m buses - Red Line Operator 2	-	buses	-	-	-	-	-	-
Operational fleet - 18m buses - Red Line Operator 1	58	buses	51	51	69	69	58	58
Operational fleet - 18m buses - Red Line Operator 2	-	buses	-	-	-	-	-	-
Operational fleet - 9m buses - Yellow Line Operator 1	-	buses	-	-	-	-	-	-
Operational fleet - 9m buses - Yellow Line Operator 2	-	buses	-	-	-	-	-	-
Operational fleet - 12m buses - Yellow Line Operator 1	-	buses	-	-	-	-	-	-
Operational fleet - 12m buses - Yellow Line Operator 2	-	buses	-	-	-	-	-	-
Operational fleet - 18m buses - Yellow Line Operator 1	-	buses	-	-	-	-	-	-
Operational fleet - 18m buses - Yellow Line Operator 2	-	buses	-	-	-	-	-	-
Bus-kms - 9m buses - Red Line Operator 1	-	bus-kms	3,846	-	5,909	-	4,941	-
Bus-kms - 9m buses - Red Line Operator 2	-	bus-kms	-	-	-	-	-	-
Bus-kms - 12m buses - Red Line Operator 1	27,280	bus-kms	22,939	25,587	36,109	40,158	23,842	27,280
Bus-kms - 12m buses - Red Line Operator 2	-	bus-kms	-	-	-	-	-	-
Bus-kms - 18m buses - Red Line Operator 1	16,645	bus-kms	14,548	14,548	19,952	19,952	16,645	16,645
Bus-kms - 18m buses - Red Line Operator 2	-	bus-kms	-	-	-	-	-	-
Bus-kms - 9m buses - Yellow Line Operator 1	-	bus-kms	-	-	-	-	-	-
Bus-kms - 9m buses - Yellow Line Operator 2	-	bus-kms	-	-	-	-	-	-
Bus-kms - 12m buses - Yellow Line Operator 1	-	bus-kms	-	-	-	-	-	-
Bus-kms - 12m buses - Yellow Line Operator 2	-	bus-kms	-	-	-	-	-	-
Bus-kms - 18m buses - Yellow Line Operator 1	-	bus-kms	-	-	-	-	-	-
Bus-kms - 18m buses - Yellow Line Operator 2	-	bus-kms	-	-	-	-	-	-

TRANSKARACHI

System Cash Flows in First Year of Operation (Nominal Values, 2021)								
Revenues - Fare revenues	2,121	PKR million	2,435	2,435	1,759	1,759	2,121	2,121
Revenues - Advertising on stations	487	PKR million	487	487	487	487	487	487
Revenues - Commercial activities on stations	635	PKR million	635	635	635	635	635	635
Revenue TransKarachi	3,243	PKR million	3,557	3,557	2,881	2,881	3,243	3,243
OpEx - Payments to BRT Vehicle Operator	(1,872)	PKR million	(1,777)	(1,725)	(2,580)	(2,503)	(1,935)	(1,872)
OpEx - Payments to System Control Service Provider	(1,203)	PKR million	(1,203)	(1,179)	(1,375)	(1,341)	(1,231)	(1,203)
OpEx - Payments to Fund Manager	(21)	PKR million	(21)	(21)	(21)	(21)	(21)	(21)
OpEx - TransKarachi Staff	(307)	PKR million	(307)	(307)	(307)	(307)	(307)	(307)
OpEx - TransKarachi Overheads	(66)	PKR million	(66)	(66)	(66)	(66)	(66)	(66)
Sales tax on services paid	(205)	PKR million	(205)	(200)	(234)	(228)	(209)	(205)
Net Operating Cash Flow TransKarachi	(431)	PKR million	(22)	58	(1,702)	(1,585)	(527)	(431)
Net Operating Cash Flows								
Net Operating Cash Flow TransKarachi 2021	(431)	PKR million	(22)	58	(1,702)	(1,585)	(527)	(431)
Net Operating Cash Flow TransKarachi 2022	(445)	PKR million	(16)	69	(1,779)	(1,657)	(545)	(445)
Net Operating Cash Flow TransKarachi 2023	(465)	PKR million	(15)	74	(1,866)	(1,737)	(570)	(465)
Net Operating Cash Flow TransKarachi 2024	(452)	PKR million	21	114	(1,923)	(1,788)	(563)	(452)
Net Operating Cash Flow TransKarachi 2025	(463)	PKR million	34	132	(2,007)	(1,865)	(579)	(463)
Net Operating Cash Flow TransKarachi 2026	(473)	PKR million	49	151	(2,095)	(1,946)	(595)	(473)
Net Operating Cash Flow TransKarachi 2027	(484)	PKR million	64	172	(2,186)	(2,030)	(611)	(484)
Net Operating Cash Flow TransKarachi 2028	(494)	PKR million	81	195	(2,281)	(2,117)	(628)	(494)
Net Operating Cash Flow TransKarachi 2029	(504)	PKR million	100	219	(2,381)	(2,208)	(645)	(504)
Net Operating Cash Flow TransKarachi 2030	(514)	PKR million	120	245	(2,484)	(2,304)	(662)	(514)
Net Operating Cash Flow TransKarachi 2031	(59)	PKR million	607	692	(1,800)	(1,675)	(161)	(59)
Net Operating Cash Flow TransKarachi 2032	(45)	PKR million	654	744	(1,873)	(1,742)	(152)	(45)
Milestone Payments								
Total Milestone Payment - BRT Vehicle Operator	-	PKR million	-	-	-	-	-	-
Total Milestone Payment - System Control Service Provider	-	PKR million	-	-	-	-	-	-
Total Milestone Payment	-	PKR million	-	-	-	-	-	-

BRT VEHICLE OPERATOR

Remuneration								
Bus-kilometre charge (at operations start) - 9m buses	-	PKR	137	-	136	-	135	-
Bus-kilometre charge (at operations start) - 12m buses	156	PKR	160	158	155	154	159	156
Bus-kilometre charge (at operations start) - 18m buses	171	PKR	171	172	167	167	171	171
Financing Plan								
Total Equity Injection	-	PKR million	-	-	-	-	-	-
Total Drawdown - Milestone Bridge Facility	-	PKR million	-	-	-	-	-	-
Total Drawdown - Senior Debt Facility	-	PKR million	-	-	-	-	-	-
Total Sources	-	PKR million	-	-	-	-	-	-
Total CapEx - BRT Vehicle Operator POS	-	PKR million	-	-	-	-	-	-
Financial costs paid during development period POS	-	PKR million	-	-	-	-	-	-
Tax paid during development period POS	-	PKR million	-	-	-	-	-	-
Total Uses	-	PKR million	-	-	-	-	-	-
Financial Indicators								
Project IRR	na	%	na	na	na	na	na	na
Project NPV	na	PKR million	na	na	na	na	na	na
Shareholder IRR	na	%	na	na	na	na	na	na
Shareholder NPV	na	PKR million	na	na	na	na	na	na

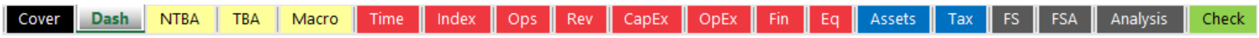
SYSTEM CONTROL SERVICE PROVIDER

Remuneration								
Fixed fee (at operations start)	96	PKR million	95	93	111	108	98	96
Financing Plan								
Total Equity Injection SCSP	-	PKR million	-	-	-	-	-	-
Total Drawdown - Milestone Bridge Facility SCSP	-	PKR million	-	-	-	-	-	-
Total Drawdown - Senior Debt Facility SCSP	-	PKR million	-	-	-	-	-	-
Total Sources	-	PKR million	-	-	-	-	-	-
Total CapEx - System Control Service Provider POS	-	PKR million	-	-	-	-	-	-
Financial costs paid during development period SCSP POS	-	PKR million	-	-	-	-	-	-
Tax paid during development period SCSP POS	-	PKR million	-	-	-	-	-	-
Total Uses	-	PKR million	-	-	-	-	-	-
Financial Indicators								
Project IRR SCSP	na	%	na	na	na	na	na	na
Project NPV SCSP	na	PKR million	na	na	na	na	na	na
Shareholder IRR SCSP	na	%	na	na	na	na	na	na
Shareholder NPV SCSP	na	PKR million	na	na	na	na	na	na

5. Structure and Contents of the Financial Model

5.1 Structure of the Financial Model

The structure of the model is as follows:`



- Cover: model cover sheet;
- Dash: dashboard with key inputs and operational scenarios for optimisation of operating fees;
- NTBA: Non-Time Based Assumptions, comprising all model assumptions which are not time-series;
- TBA: Time Based Assumptions, comprising all model assumptions which are time-series
- Macro: macro sheet that serves as a workaround to circular links in the model;
- Time: timing sheet for calculating all relevant model timelines;
- Index: indexation sheet for calculating all escalations, discount factors, etc. across time;
- Ops: operations calculating sheet, comprising all relevant quantities and volumes required to calculate revenues and costs from operations
- Rev: revenue calculation sheet calculating all revenues from fares and ancillary sources, as well as from calculated and optimised VOC and SCSP;
- Capex: capex calculation sheet calculating all capital expenditure aspects;
- Opex: opex calculation sheet calculating all operating expenditures for VOC, SCSP and TransKarachi;
- Fin: financing calculation sheet, comprising financing requirements of VOC and SCSP;
- Eq: equity calculation sheet calculating equity for VOC and SCSP;
- Assets: asset calculation sheet calculating all assets for VOC and SCSP
- Tax: all calculations pertaining to corporate income tax, federal tax and sales tax;
- FS: quarterly financial statements for VOC and SCSP, and cash flow statement for TransKarachi;
- FSA: annual financial statements for VOC and SCSP, and cash flow statement for TransKarachi;
- Analysis: analysis calculation sheet calculating financial performance indicators and ratios for VOC and SCSP; and
- Check: check on model integrity and robustness

5.2 Methodology of the Financial Model

A well-built financial model should be understandable to any government official or business person, regardless of their level of proficiency in Microsoft Excel. Furthermore, it is normally the case that financial models (1) must be built under short lead times, (2) must be readily adaptable as circumstances change over the course of the project and (3) must be built in a way that controls the risk of omissions and logical errors.

The FAST Standard (www.fast-standard.org) sets out both a set of design principles and consistent methodology for the construction of financial models that ensures all of these requirements are met.

Models built using the FAST Standard are:

- **Flexible**; allowing models to be adapted easily and quickly in case of availability of new/updated information;
- **Appropriate**; model design ensures that "form follows function" and the model delivers the business requirement;
- **Structured**; rigorous consistency in layout and organisation is essential to retain a model's logical integrity over time, particularly as a model's author may change; and
- **Transparent**; FAST is founded on simple, clear calculations that can be understood by other modellers and non-modellers alike.

Of these four principles, greatest emphasis is placed on transparency; a well-built financial model should be understandable to any person, regardless of their level of proficiency in Microsoft Excel. This unique emphasis is the key to reducing spreadsheet risk. Developed over many years, FAST is a 'shared modelling language' based on a series of 'trade-mark' characteristics that ensure transparency, efficient implementation, easy navigability and maintainability, high quality and robustness.

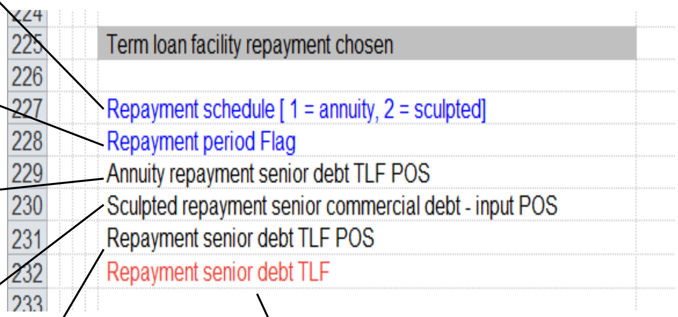
These characteristics include:

- **Complicated logic broken-down into small, simple pieces of logic**

Calculations in financial models should be straightforward and simple to follow: step, by step, by step. The occurrence of long formulas mean that the calculation should probably be broken down into constituent parts. As much as possible, formula length is limited to the so-called "rule of thumb".

- **Each of the small pieces of logic is made up of ingredients, calculations and results**

This is essential. Every calculation is built up by (1) restating the inputs by calling them up from different sheets or from the same sheet, (2) carrying out the calculation and, when applicable, (3) stating the result of the calculation for use in the next calculation or for use in another worksheet.



225	Term loan facility repayment chosen
226	
227	Repayment schedule [1 = annuity, 2 = sculpted]
228	Repayment period Flag
229	Annuity repayment senior debt TLF POS
230	Sculpted repayment senior commercial debt - input POS
231	Repayment senior debt TLF POS
232	Repayment senior debt TLF
233	

=ntba!E$812, constant, input, from other worksheet, switches debt repayment between 1/2

=time!J$816, line, input, from other worksheet, indicates in which period to repay debt

=time!J$816, line, input, from other worksheet, indicates in which period to repay debt

=J209, line, input, from same worksheet, states repayments in case of option 1

=tba!J16, line, input, from other worksheet, states repayments in case of option 2

= IF(J228 = 1; CHOOSE($F$227; J229; J230); 0), calculation, selects repayment option 1 or 2

= 0-J231, calculation, changes the sign of the previous row for use in other parts of the model

The first cause of model problems is calculations of the value of the same item for each year across multiple columns, using different formulas to calculate the result. FAST prescribes formula consistency, meaning that each and every cell in a row of the model must have the same formula. Of course, to calculate interest in year X, you need the debt on balance in year X as input, and in year Y you need the debt on balance in year Y. However, the structure of the formula (e.g. = [debt on balance] * [interest rate percentage]) must not change.

- **Labels and units are part of each ingredient, each calculation and each result**

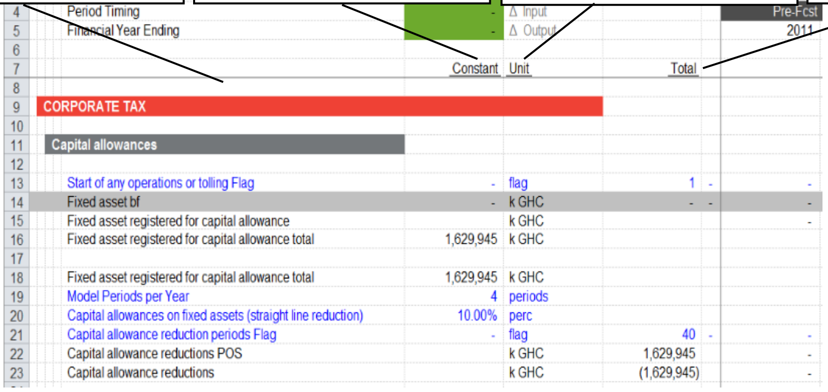
This is to say that i.e. each line item has the 3 properties, namely its name, unit and value. In addition, the model setup contains both constants, which are single figure items instead of line items, as well as item totals.

Name column indicates the names of the calculations/ parameters. Names should not be duplicated for different calculations, parameters, etc.

Constants column contains single value parameters. May also be used for totals of line items to be used in further calculations

Unit column indicates the unit of the constant or line item. E.g. currencies, time units, percentages, so-called flags to indicate timing, etc.

Total column calculates the totals for line items to the right. Only for display and comparisons, not for onward use in calculations.



4	Period Timing	-	Δ Input			Pre-Fcst
5	Financial Year Ending	-	Δ Output			2011
6						
7		Constant	Unit	Total		
8						
9	CORPORATE TAX					
10						
11	Capital allowances					
12						
13	Start of any operations or tolling Flag	-	flag	1	-	-
14	Fixed asset bf	-	k GHC	-	-	-
15	Fixed asset registered for capital allowance		k GHC			-
16	Fixed asset registered for capital allowance total	1,629,945	k GHC			
17						
18	Fixed asset registered for capital allowance total	1,629,945	k GHC			
19	Model Periods per Year	4	periods			
20	Capital allowances on fixed assets (straight line reduction)	10.00%	perc			
21	Capital allowance reduction periods Flag	-	flag	40	-	-
22	Capital allowance reductions POS		k GHC	1,629,945		-
23	Capital allowance reductions		k GHC	(1,629,945)		-

- **Limited number of Excel functions minimal use of range names and macros**

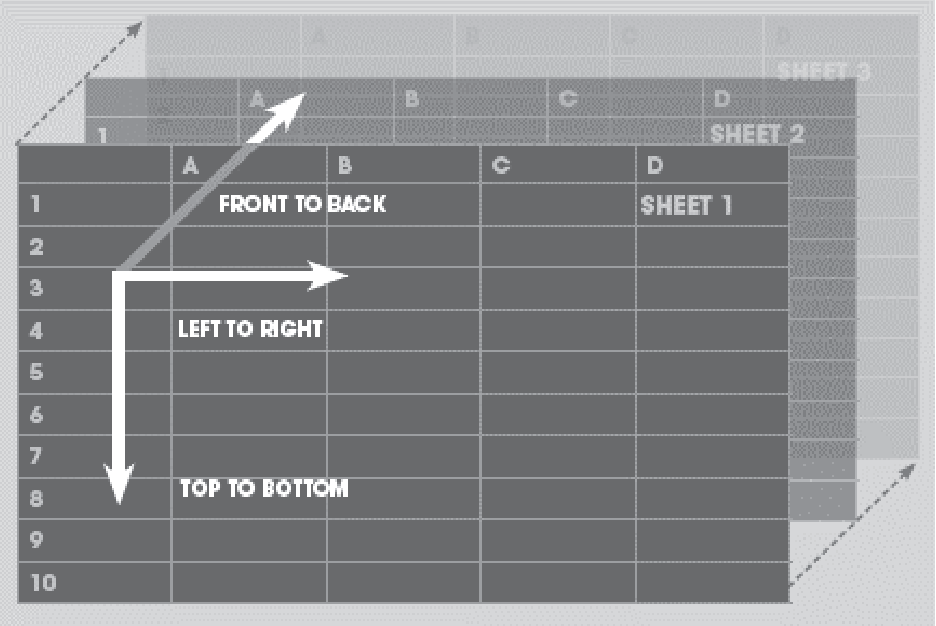
For FAST modelling, exotic Excel functions should be avoided and instead reproduced by their constituent calculations (e.g. even the Net Present Value should be calculated separately rather than using the Excel NPV function, which sometimes produces incorrect results).

Names (variables callable throughout the Excel workbook by reference to a global variable name instead of cell reference) and macros (Microsoft Visual Basic program code embedded in the Excel workbook and used to carry out specific actions on the model) are only used for model optimisation.

- **FAST models follow a logical and coherent flow from top to bottom and left to right**

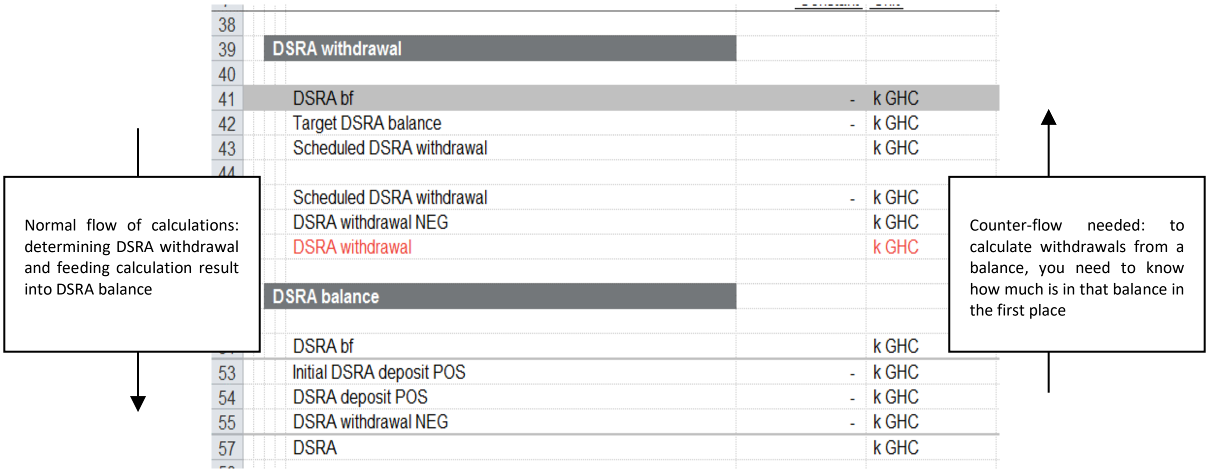
The same way we read, we develop FAST models.

Across the workbook, the worksheets containing hard-coded inputs come first, followed by calculation worksheets related to the project, followed by calculation worksheets related to the project cash flows, followed by calculation worksheets related to how to finance those project cash flows, followed by accounting calculation worksheets, followed by output sheets related to financial statements and other analyses.



Within the worksheet, calculations should only use inputs drawn from other previous worksheets or previous calculations on the same worksheet. As this is not possible in some cases, a so-called counter-flow is required.

This is indicated by a grey marking of the line item in question (not to be confused with single-column grey marking of headers).



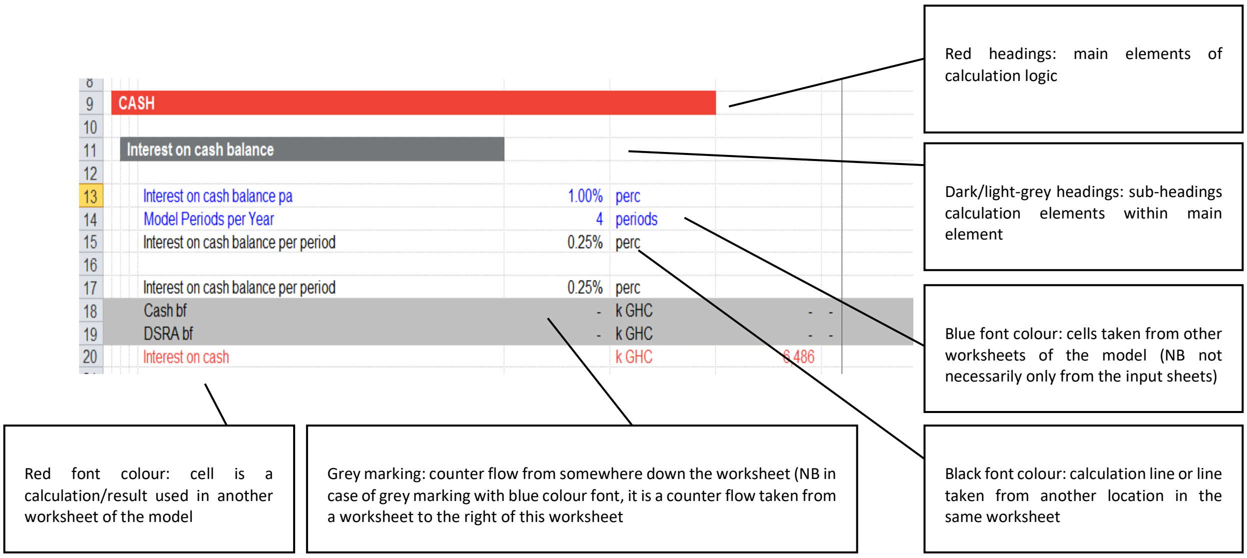
38
39 DSRA withdrawal
40
41 DSRA bf - k GHC
42 Target DSRA balance - k GHC
43 Scheduled DSRA withdrawal k GHC
Scheduled DSRA withdrawal - k GHC
DSRA withdrawal NEG k GHC
DSRA withdrawal k GHC
DSRA balance
DSRA bf k GHC
53 Initial DSRA deposit POS - k GHC
54 DSRA deposit POS - k GHC
55 DSRA withdrawal NEG - k GHC
57 DSRA k GHC

Normal flow of calculations: determining DSRA withdrawal and feeding calculation result into DSRA balance

Counter-flow needed: to calculate withdrawals from a balance, you need to know how much is in that balance in the first place

- **Simple visual colour coding**

Changing cell marking, line marking and font colours makes it easy to recognise the nature of different parts of the model.



9 CASH
10
11 Interest on cash balance
12
13 Interest on cash balance pa 1.00% perc
14 Model Periods per Year 4 periods
15 Interest on cash balance per period 0.25% perc
16
17 Interest on cash balance per period 0.25% perc
18 Cash bf - k GHC - -
19 DSRA bf - k GHC - -
20 Interest on cash k GHC 6,486

Red headings: main elements of calculation logic

Dark/light-grey headings: sub-headings calculation elements within main element

Blue font colour: cells taken from other worksheets of the model (NB not necessarily only from the input sheets)

Red font colour: cell is a calculation/result used in another worksheet of the model

Grey marking: counter flow from somewhere down the worksheet (NB in case of grey marking with blue colour font, it is a counter flow taken from a worksheet to the right of this worksheet

Black font colour: calculation line or line taken from another location in the same worksheet

6. Costs, Revenues and Results of the Financial Model

6.1 Operational Costs of the Model

The following table outlines the various operational costs[1] for the first operational year that would fall under the system under the different operational scenarios: Values are in PKR millions

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[1] The capital costs (which include bus fleet, AFC and ITS) were agreed to be separately funded and as such, do not fall under the scope of the VOC, SCSP, nor TransKarachi.

in PKR millions	*RL - FS 15(2km) - FC 1*	*RL - FS 15(2km) - FC 2*	*RL - FS 10(5km) - FC 1*	*RL - FS 10(5km) - FC 2*	*RL - FS 20(5km) - FC 1*	*RL - FS 20(5km) - FC 2*
VOC	(17,835)	(17,203)	(26,302)	(25,385)	(19,502)	(18,755)
Drivers	(3,477)	(3,270)	(5,238)	(4,953)	(3,827)	(3,587)
Mechanics	(278)	(259)	(408)	(382)	(298)	(278)
Schedulers	(171)	(155)	(264)	(233)	(202)	(186)
Management	(311)	(259)	(414)	(363)	(311)	(259)
Fuel	(1,038)	(1,048)	(1,540)	(1,555)	(1,140)	(1,153)
Electricity	-	-	-	-	-	-
Maintenance and parts	(10,898)	(10,582)	(16,340)	(15,849)	(11,978)	(11,582)
Office costs	(601)	(601)	(601)	(601)	(601)	(601)
Performance bond	(1,061)	(1,029)	(1,496)	(1,449)	(1,147)	(1,108)
SCSP	(8,148)	(7,985)	(9,314)	(9,084)	(8,338)	(8,148)
Conductors	(2,293	(2,131)	(3,460)	(3,230)	(2,484)	(2,293)
Station staff	(4,124)	(4,124)	(4,124)	(4,124)	(4,124)	(4,124)
ITS and control centre staff	(737)	(737)	(737)	(737)	(737)	(737)
SCSP management staff	(205)	(205)	(205)	(205)	(205)	(205)
Station cleaning and maintenance	(276)	(276)	(276)	(276)	(276)	(276)

in PKR millions	*RL - FS 15(2km) - FC 1*	*RL - FS 15(2km) - FC 2*	*RL - FS 10(5km) - FC 1*	*RL - FS 10(5km) - FC 2*	*RL - FS 20(5km) - FC 1*	*RL - FS 20(5km) - FC 2*
Station utilities and supplies	(276)	(276)	(276)	(276)	(276)	(276)
SCSP office costs	(237)	(237)	(237)	(237)	(237)	(237)
TransKarachi	(5,825)	(5,825)	(5,825)	(5,825)	(5,825)	(5,825)
Permanent staff	(3,471)	(3,471)	(3,471)	(3,471)	(3,471)	(3,471)
Interim staff	(2)	(2)	(2)	(2)	(2)	(2)
Honorariums	(26)	(26)	(26)	(26)	(26)	(26)
PPIU staff	(1,065)	(1,065)	(1,065)	(1,065)	(1,065)	(1,065)
International advisor	(62)	(62)	(62)	(62)	(62)	(62)
Employee insurances	(172)	(172)	(172)	(172)	(172)	(172)
Office rent	(13)	(13)	(13)	(13)	(13)	(13)
Office renovation	(65)	(65)	(65)	(65)	(65)	(65)
Communication costs	(38)	(38)	(38)	(38)	(38)	(38)
Utilities	(80)	(80)	(80)	(80)	(80)	(80)
Transportation and generators	(109)	(109)	(109)	(109)	(109)	(109)
General expenses	(628)	(628)	(628)	(628)	(628)	(628)
Repair and maintenance	(95)	(95)	(95)	(95)	(95)	(95)

6.2 Revenues (including auxiliary revenues) of the Model

The following table outlines the various revenues for the first operational year under the different operational scenarios:

in PKR millions	*RL - FS 15(2km) - FC 1*	*RL - FS 15(2km) - FC 2*	*RL - FS 10(5km) - FC 1*	*RL - FS 10(5km) - FC 2*	*RL - FS 20(5km) - FC 1*	*RL - FS 20(5km) - FC 2*
Fare revenues	2,435	2,435	1,759	1,759	2,121	2,121
Advertising on stations	487	487	487	487	487	487
Commercial activities on stations	635	635	635	635	635	635

The financial model allocates the non-fare revenue to TransKarachi's revenue streams, except advertising on buses, whose revenue is allocated to VOC's revenue streams.

6.3 Financial Results of the Model

The following table outlines TransKarachi's net operating cash flow (Net OCF) results for the first operational year under the different operational scenarios:

in PKR millions	*RL - FS 15(2km) - FC 1*	*RL - FS 15(2km) - FC 2*	*RL - FS 10(5km) - FC 1*	*RL - FS 10(5km) - FC 2*	*RL - FS 20(5km) - FC 1*	*RL - FS 20(5km) - FC 2*
Net OCF 2021	(22)	58	(1,702)	(1,585)	(527)	(431)
Net OCF 2022	(16)	69	(1,779)	(1,657)	(545)	(445)
Net OCF 2023	(15)	74	(1,866)	(1,737)	(570)	(465)
Net OCF 2024	21	114	(1,923)	(1,788)	(563)	(452)
Net OCF 2025	34	132	(2,007)	(1,865)	(579)	(463)
Net OCF 2026	49	151	(2,095)	(1,946)	(595)	(473)
Net OCF 2027	64	172	(2,186)	(2,030)	(611)	(484)
Net OCF 2028	81	195	(2,281)	(2,117)	(628)	(494)
Net OCF 2029	100	219	(2,381)	(2,208)	(645)	(504)
Net OCF 2030	120	245	(2,484)	(2,304)	(662)	(514)
Net OCF 2031	142	273	(2,593)	(2,403)	(679)	(524)
Net OCF 2032	166	304	(2,706)	(2,506)	(696)	(533)

Annex A – Red Line Revenues and OPEX Summary

The breakdown of the revenues and costs of the financial model are presented in the following tables:

- Table 2: Red Line Revenues and OPEX Summary [in PKR millions] – FS 15 (2km) – FC1
- Table 3: Red Line Revenues and OPEX Summary [in PKR millions] – FS 15 (2km) – FC2
- Table 4: Red Line Revenues and OPEX Summary [in PKR millions] – FS 10 (5km) – FC1
- Table 5: Red Line Revenues and OPEX Summary [in PKR millions] – FS 10 (5km) – FC2
- Table 6: Red Line Revenues and OPEX Summary [in PKR millions] – FS 20 (5km) – FC1
- Table 7: Red Line Revenues and OPEX Summary [in PKR millions] – FS 20 (5km) – FC2

Note that the summary tables presented therein are an extract of the cost headings taken from the financial model, which do not exactly follow the breakdown presented in this comment. Furthermore, the version of the financial model submitted is already optimized and is intended for viewing to access the results and not be modified for re-optimization. The cost of utility bills is already included in the shared version of the financial model, under Station utilities and supplies.

a) The breakdown of the station manager costs is included in the summary tables under SCSP
b) Fund manager payments are estimated on the basis of a monthly charge payable for services provided, as is usually the case. The staffing and logistic details are not included in the financial model
c) Infrastructure maintenance costs are not within the scope of the PPP contract. The PPP contract limits the maintenance costs on the goods the private sector is providing (buses, stations, etc.)
d) The breakdown for generators, lifts, escalator maintenance and refueling costs are not included in the financial model. These costs are considered included under the station manager cleaning and maintenance costs, included in the summary tables under SCSP
e) The breakdown of the ITS operations is included in the summary tables under SCSP

Table 2: Red Line Revenues and OPEX Summary [in PKR millions] – FS 15 (2km) – FC1

	Total	Year 01	Year 02	Year 03	Year 04	Year 05	Year 06	Year 07	Year 08	Year 09	Year 10	Year 11	Year 12
REVENUES													
TransKarachi													
Fare revenues	38,751	2,435	2,556	2,684	2,818	2,959	3,107	3,263	3,426	3,597	3,777	3,966	4,164
Advertising on stations	7,749	487	511	537	564	592	621	652	685	719	755	793	833
Commercial activities on stations	10,114	635	667	701	736	772	811	852	894	939	986	1,035	1,087
TransKarachi Total	**56,614**	**3,557**	**3,735**	**3,921**	**4,117**	**4,323**	**4,539**	**4,766**	**5,005**	**5,255**	**5,518**	**5,794**	**6,083**
OPEX													
Vehicle Operating Company													
Staff	4,237	266	280	293	308	324	340	357	375	393	413	434	455
Fuel / electricity	1,038	65	68	72	76	79	83	87	92	96	101	106	112
Maintenance and spare parts	10,898	685	719	755	793	832	874	918	963	1,012	1,062	1,115	1,171
Overheads	1,662	108	110	118	120	130	132	142	145	156	158	170	174
Taxes	5,656	377	393	407	425	440	459	476	496	514	536	555	579
Profit margin (based on 30% OCF margin)	3,832	277	286	292	301	307	316	322	332	337	347	352	363
VOC Total	**27,324**	**1,777**	**1,856**	**1,937**	**2,022**	**2,111**	**2,204**	**2,301**	**2,402**	**2,508**	**2,618**	**2,733**	**2,853**
System Control Service Provider													
Conductors	2,293	182	191	201	211	222	233	244	257	269	283	-	-
Station staff	4,124	328	344	361	380	399	418	439	461	484	509	-	-
IT and control centre staff	737	59	62	65	68	71	75	79	82	87	91	-	-
Management staff	205	16	17	18	19	20	21	22	23	24	25	-	-
Station cleaning and maintenance	276	22	23	24	25	27	28	29	31	32	34	-	-
Station utilities and supplies	276	22	23	24	25	27	28	29	31	32	34	-	-
Office costs	237	19	20	21	22	23	24	25	27	28	29	-	-
Taxes	3,003	239	251	263	276	290	305	320	336	353	370	-	-
Profit margin (based on 30% OCF margin)	3,981	316	332	349	366	385	404	424	445	468	491	-	-
SCSP Total	**15,131**	**1,203**	**1,263**	**1,326**	**1,393**	**1,462**	**1,535**	**1,612**	**1,693**	**1,777**	**1,866**	**-**	**-**
TransKarachi													
Payments to VOC	27,324	1,777	1,856	1,937	2,022	2,111	2,204	2,301	2,402	2,508	2,618	2,733	2,853
Payments to SCSP	19,149	1,203	1,263	1,326	1,393	1,462	1,535	1,612	1,693	1,777	1,866	1,960	2,058
Payments to Fund Manager	338	21	22	23	25	26	27	28	30	31	33	35	36
Staff	4,797	307	325	351	346	363	381	400	420	441	463	487	511
Overheads	1,028	66	69	72	74	78	82	86	90	95	100	105	110
Taxes	3,255	205	215	225	237	249	261	274	288	302	317	333	350
TransKarachi Total	**55,890**	**3,579**	**3,751**	**3,936**	**4,097**	**4,289**	**4,491**	**4,702**	**4,923**	**5,155**	**5,398**	**5,652**	**5,918**

Table 3: Red Line Revenues and OPEX Summary [in PKR millions] – FS 15 (2km) – FC2

	Total	Year 01	Year 02	Year 03	Year 04	Year 05	Year 06	Year 07	Year 08	Year 09	Year 10	Year 11	Year 12
REVENUES													
TransKarachi													
Fare revenues	38,751	2,435	2,556	2,684	2,818	2,959	3,107	3,263	3,426	3,597	3,777	3,966	4,164
Advertising on stations	7,749	487	511	537	564	592	621	652	685	719	755	793	833
Commercial activities on stations	10,114	635	667	701	736	772	811	852	894	939	986	1,035	1,087
TransKarachi Total	**56,614**	**3,557**	**3,735**	**3,921**	**4,117**	**4,323**	**4,539**	**4,766**	**5,005**	**5,255**	**5,518**	**5,794**	**6,083**
OPEX													
Vehicle Operating Company													
Staff	3,943	248	260	273	287	301	316	332	349	366	384	404	424
Fuel / electricity	1,048	66	69	73	76	80	84	88	93	97	102	107	113
Maintenance and spare parts	10,582	665	698	733	770	808	849	891	936	982	1,031	1,083	1,137
Overheads	1,629	108	110	116	118	127	129	139	141	152	155	167	170
Taxes	5,456	363	379	393	410	425	443	459	478	496	517	535	558
Profit margin (based on 30% OCF margin)	3,828	275	285	292	301	307	316	322	332	337	347	352	363
VOC Total	**26,487**	**1,725**	**1,800**	**1,879**	**1,962**	**2,047**	**2,137**	**2,231**	**2,328**	**2,430**	**2,537**	**2,648**	**2,763**
System Control Service Provider													
Conductors	2,131	169	178	187	196	206	216	227	238	250	263	-	-
Station staff	4,124	328	344	361	380	399	418	439	461	484	509	-	-
IT and control centre staff	737	59	62	65	68	71	75	79	82	87	91	-	-
Management staff	205	16	17	18	19	20	21	22	23	24	25	-	-
Station cleaning and maintenance	276	22	23	24	25	27	28	29	31	32	34	-	-
Station utilities and supplies	276	22	23	24	25	27	28	29	31	32	34	-	-
Office costs	237	19	20	21	22	23	24	25	27	28	29	-	-
Taxes	2,943	234	246	258	271	284	299	314	329	346	363	-	-
Profit margin (based on 30% OCF margin)	3,901	310	326	342	359	377	396	416	436	458	481	-	-
SCSP Total	**14,829**	**1,179**	**1,238**	**1,300**	**1,365**	**1,433**	**1,505**	**1,580**	**1,659**	**1,742**	**1,829**	**-**	**-**
TransKarachi													
Payments to VOC	26,487	1,725	1,800	1,879	1,962	2,047	2,137	2,231	2,328	2,430	2,537	2,648	2,763
Payments to SCSP	18,766	1,179	1,238	1,300	1,365	1,433	1,505	1,580	1,659	1,742	1,829	1,920	2,016
Payments to Fund Manager	338	21	22	23	25	26	27	28	30	31	33	35	36
Staff	4,797	307	325	351	346	363	381	400	420	441	463	487	511
Overheads	1,028	66	69	72	74	78	82	86	90	95	100	105	110
Taxes	3,190	200	210	221	232	244	256	269	282	296	311	326	343
TransKarachi Total	**54,606**	**3,499**	**3,666**	**3,847**	**4,003**	**4,191**	**4,388**	**4,594**	**4,810**	**5,036**	**5,272**	**5,520**	**5,780**

Table 4: Red Line Revenues and OPEX Summary [in PKR millions] – FS 10 (5km) – FC1

	Total	Year 01	Year 02	Year 03	Year 04	Year 05	Year 06	Year 07	Year 08	Year 09	Year 10	Year 11	Year 12
REVENUES													
TransKarachi													
Fare revenues	27,999	1,759	1,847	1,939	2,036	2,138	2,245	2,357	2,475	2,599	2,729	2,865	3,009
Advertising on stations	7,749	487	511	537	564	592	621	652	685	719	755	793	833
Commercial activities on stations	10,114	635	667	701	736	772	811	852	894	939	986	1,035	1,087
TransKarachi Total	**45,862**	**2,881**	**3,025**	**3,177**	**3,335**	**3,502**	**3,677**	**3,861**	**4,054**	**4,257**	**4,470**	**4,693**	**4,928**
OPEX													
Vehicle Operating Company													
Staff	6,325	397	417	438	460	483	507	532	559	587	616	647	680
Fuel / electricity	1,540	97	102	107	112	118	124	130	136	143	150	158	166
Maintenance and spare parts	16,340	1,027	1,078	1,132	1,188	1,248	1,310	1,376	1,444	1,517	1,593	1,672	1,756
Overheads	2,097	108	110	154	156	169	171	185	188	203	206	223	226
Taxes	8,341	555	581	591	619	643	673	699	732	761	796	827	865
Profit margin (based on 30% OCF margin)	5,448	396	411	400	416	426	444	454	472	482	502	512	532
VOC Total	**40,090**	**2,580**	**2,698**	**2,822**	**2,951**	**3,086**	**3,228**	**3,376**	**3,531**	**3,693**	**3,862**	**4,039**	**4,224**
System Control Service Provider													
Conductors	3,460	275	289	303	318	334	351	369	387	406	427	-	-
Station staff	4,124	328	344	361	380	399	418	439	461	484	509	-	-
IT and control centre staff	737	59	62	65	68	71	75	79	82	87	91	-	-
Management staff	205	16	17	18	19	20	21	22	23	24	25	-	-
Station cleaning and maintenance	276	22	23	24	25	27	28	29	31	32	34	-	-
Station utilities and supplies	276	22	23	24	25	27	28	29	31	32	34	-	-
Office costs	237	19	20	21	22	23	24	25	27	28	29	-	-
Taxes	3,433	273	287	301	316	332	348	366	384	403	423	-	-
Profit margin (based on 30% OCF margin)	4,551	362	380	399	419	440	462	485	509	535	561	-	-
SCSP Total	**17,298**	**1,375**	**1,444**	**1,516**	**1,592**	**1,672**	**1,755**	**1,843**	**1,935**	**2,032**	**2,133**	**-**	**-**
TransKarachi													
Payments to VOC	40,090	2,580	2,698	2,822	2,951	3,086	3,228	3,376	3,531	3,693	3,862	4,039	4,224
Payments to SCSP	21,890	1,375	1,444	1,516	1,592	1,672	1,755	1,843	1,935	2,032	2,133	2,240	2,352
Payments to Fund Manager	338	21	22	23	25	26	27	28	30	31	33	35	36
Staff	4,797	307	325	351	346	363	381	400	420	441	463	487	511
Overheads	1,028	66	69	72	74	78	82	86	90	95	100	105	110
Taxes	3,721	234	245	258	271	284	298	313	329	345	363	381	400
TransKarachi Total	**71,864**	**4,583**	**4,805**	**5,043**	**5,259**	**5,509**	**5,772**	**6,047**	**6,336**	**6,638**	**6,954**	**7,286**	**7,634**

Table 5: Red Line Revenues and OPEX Summary [in PKR millions] – FS 10 (5km) – FC2

	Total	Year 01	Year 02	Year 03	Year 04	Year 05	Year 06	Year 07	Year 08	Year 09	Year 10	Year 11	Year 12
REVENUES													
TransKarachi													
Fare revenues	27,999	1,759	1,847	1,939	2,036	2,138	2,245	2,357	2,475	2,599	2,729	2,865	3,009
Advertising on stations	7,749	487	511	537	564	592	621	652	685	719	755	793	833
Commercial activities on stations	10,114	635	667	701	736	772	811	852	894	939	986	1,035	1,087
TransKarachi Total	**45,862**	**2,881**	**3,025**	**3,177**	**3,335**	**3,502**	**3,677**	**3,861**	**4,054**	**4,257**	**4,470**	**4,693**	**4,928**
OPEX													
Vehicle Operating Company													
Staff	5,931	373	391	411	431	453	476	499	524	551	578	607	637
Fuel / electricity	1,555	98	103	108	113	119	125	131	137	144	152	159	167
Maintenance and spare parts	15,849	996	1,046	1,098	1,153	1,210	1,271	1,334	1,401	1,471	1,545	1,622	1,703
Overheads	2,050	108	110	150	152	164	167	180	183	198	201	217	220
Taxes	8,051	536	560	571	598	621	650	675	706	734	768	798	834
Profit margin (based on 30% OCF margin)	5,431	393	408	399	416	426	443	453	471	481	500	511	531
VOC Total	**38,868**	**2,503**	**2,617**	**2,737**	**2,862**	**2,993**	**3,130**	**3,273**	**3,423**	**3,579**	**3,743**	**3,914**	**4,093**
System Control Service Provider													
Conductors	3,230	257	270	283	297	312	328	344	361	379	398	-	-
Station staff	4,124	328	344	361	380	399	418	439	461	484	509	-	-
IT and control centre staff	737	59	62	65	68	71	75	79	82	87	91	-	-
Management staff	205	16	17	18	19	20	21	22	23	24	25	-	-
Station cleaning and maintenance	276	22	23	24	25	27	28	29	31	32	34	-	-
Station utilities and supplies	276	22	23	24	25	27	28	29	31	32	34	-	-
Office costs	237	19	20	21	22	23	24	25	27	28	29	-	-
Taxes	3,348	266	279	293	308	324	340	357	375	393	413	-	-
Profit margin (based on 30% OCF margin)	4,438	353	370	389	408	429	450	473	497	521	547	-	-
SCSP Total	**16,870**	**1,341**	**1,408**	**1,479**	**1,553**	**1,630**	**1,712**	**1,797**	**1,887**	**1,982**	**2,081**	**-**	**-**
TransKarachi													
Payments to VOC	38,868	2,503	2,617	2,737	2,862	2,993	3,130	3,273	3,423	3,579	3,743	3,914	4,093
Payments to SCSP	21,349	1,341	1,408	1,479	1,553	1,630	1,712	1,797	1,887	1,982	2,081	2,185	2,294
Payments to Fund Manager	338	21	22	23	25	26	27	28	30	31	33	35	36
Staff	4,797	307	325	351	346	363	381	400	420	441	463	487	511
Overheads	1,028	66	69	72	74	78	82	86	90	95	100	105	110
Taxes	3,629	228	239	251	264	277	291	306	321	337	354	371	390
TransKarachi Total	**70,009**	**4,466**	**4,682**	**4,914**	**5,124**	**5,368**	**5,623**	**5,891**	**6,172**	**6,465**	**6,773**	**7,096**	**7,434**

Table 6: Red Line Revenues and OPEX Summary [in PKR millions] – FS 20 (5km) – FC1

	Total	Year 01	Year 02	Year 03	Year 04	Year 05	Year 06	Year 07	Year 08	Year 09	Year 10	Year 11	Year 12
REVENUES													
TransKarachi													
Fare revenues	33,756	2,121	2,227	2,338	2,455	2,578	2,707	2,842	2,984	3,133	3,290	3,454	3,627
Advertising on stations	7,749	487	511	537	564	592	621	652	685	719	755	793	833
Commercial activities on stations	10,114	635	667	701	736	772	811	852	894	939	986	1,035	1,087
TransKarachi Total	**51,618**	**3,243**	**3,405**	**3,575**	**3,754**	**3,942**	**4,139**	**4,346**	**4,563**	**4,791**	**5,031**	**5,282**	**5,547**
OPEX													
Vehicle Operating Company													
Staff	4,637	291	306	321	337	354	372	390	410	430	452	475	498
Fuel / electricity	1,140	72	75	79	83	87	91	96	101	106	111	117	122
Maintenance and spare parts	11,978	753	790	830	871	915	960	1,008	1,059	1,112	1,167	1,226	1,287
Overheads	1,747	108	110	125	127	137	140	150	153	165	168	181	184
Taxes	6,185	412	430	443	463	480	501	520	542	563	587	609	635
Profit margin (based on 30% OCF margin)	4,141	300	310	312	323	329	341	347	359	365	377	383	395
VOC Total	**29,828**	**1,935**	**2,021**	**2,111**	**2,205**	**2,303**	**2,405**	**2,512**	**2,624**	**2,740**	**2,862**	**2,989**	**3,122**
System Control Service Provider													
Conductors	2,484	197	207	218	229	240	252	265	278	292	306	-	-
Station staff	4,124	328	344	361	380	399	418	439	461	484	509	-	-
IT and control centre staff	737	59	62	65	68	71	75	79	82	87	91	-	-
Management staff	205	16	17	18	19	20	21	22	23	24	25	-	-
Station cleaning and maintenance	276	22	23	24	25	27	28	29	31	32	34	-	-
Station utilities and supplies	276	22	23	24	25	27	28	29	31	32	34	-	-
Office costs	237	19	20	21	22	23	24	25	27	28	29	-	-
Taxes	3,073	244	257	269	283	297	312	327	344	361	379	-	-
Profit margin (based on 30% OCF margin)	4,074	324	340	357	375	394	413	434	456	479	502	-	-
SCSP Total	**15,485**	**1,231**	**1,293**	**1,357**	**1,425**	**1,496**	**1,571**	**1,650**	**1,732**	**1,819**	**1,910**	**-**	**-**
TransKarachi													
Payments to VOC	29,828	1,935	2,021	2,111	2,205	2,303	2,405	2,512	2,624	2,740	2,862	2,989	3,122
Payments to SCSP	19,596	1,231	1,293	1,357	1,425	1,496	1,571	1,650	1,732	1,819	1,910	2,005	2,106
Payments to Fund Manager	338	21	22	23	25	26	27	28	30	31	33	35	36
Staff	4,797	307	325	351	346	363	381	400	420	441	463	487	511
Overheads	1,028	66	69	72	74	78	82	86	90	95	100	105	110
Taxes	3,331	209	220	231	242	254	267	280	294	309	325	341	358
TransKarachi Total	**58,918**	**3,770**	**3,951**	**4,146**	**4,317**	**4,521**	**4,734**	**4,957**	**5,191**	**5,436**	**5,693**	**5,961**	**6,243**

Table 7: Red Line Revenues and OPEX Summary [in PKR millions] – FS 20 (5km) – FC2

	Total	Year 01	Year 02	Year 03	Year 04	Year 05	Year 06	Year 07	Year 08	Year 09	Year 10	Year 11	Year 12
REVENUES													
TransKarachi													
Fare revenues	33,756	2,121	2,227	2,338	2,455	2,578	2,707	2,842	2,984	3,133	3,290	3,454	3,627
Advertising on stations	7,749	487	511	537	564	592	621	652	685	719	755	793	833
Commercial activities on stations	10,114	635	667	701	736	772	811	852	894	939	986	1,035	1,087
TransKarachi Total	**51,618**	**3,243**	**3,405**	**3,575**	**3,754**	**3,942**	**4,139**	**4,346**	**4,563**	**4,791**	**5,031**	**5,282**	**5,547**
OPEX													
Vehicle Operating Company													
Staff	4,311	271	284	299	314	329	346	363	381	400	420	441	463
Fuel / electricity	1,153	72	76	80	84	88	92	97	102	107	112	118	124
Maintenance and spare parts	11,582	728	764	802	842	884	929	975	1,024	1,075	1,129	1,185	1,245
Overheads	1,709	108	110	122	124	134	136	147	149	161	164	176	179
Taxes	5,948	396	413	427	446	462	482	500	522	541	564	585	610
Profit margin (based on 30% OCF margin)	4,131	298	308	312	323	329	340	347	358	364	376	382	394
VOC Total	**28,835**	**1,872**	**1,955**	**2,042**	**2,132**	**2,227**	**2,325**	**2,428**	**2,536**	**2,648**	**2,765**	**2,888**	**3,015**
System Control Service Provider													
Conductors	2,293	182	191	201	211	222	233	244	257	269	283	-	-
Station staff	4,124	328	344	361	380	399	418	439	461	484	509	-	-
IT and control centre staff	737	59	62	65	68	71	75	79	82	87	91	-	-
Management staff	205	16	17	18	19	20	21	22	23	24	25	-	-
Station cleaning and maintenance	276	22	23	24	25	27	28	29	31	32	34	-	-
Station utilities and supplies	276	22	23	24	25	27	28	29	31	32	34	-	-
Office costs	237	19	20	21	22	23	24	25	27	28	29	-	-
Taxes	3,003	239	251	263	276	290	305	320	336	353	370	-	-
Profit margin (based on 30% OCF margin)	3,981	316	332	349	366	385	404	424	445	468	491	-	-
SCSP Total	**15,131**	**1,203**	**1,263**	**1,326**	**1,393**	**1,462**	**1,535**	**1,612**	**1,693**	**1,777**	**1,866**	**-**	**-**
TransKarachi													
Payments to VOC	28,835	1,872	1,955	2,042	2,132	2,227	2,325	2,428	2,536	2,648	2,765	2,888	3,015
Payments to SCSP	19,149	1,203	1,263	1,326	1,393	1,462	1,535	1,612	1,693	1,777	1,866	1,960	2,058
Payments to Fund Manager	338	21	22	23	25	26	27	28	30	31	33	35	36
Staff	4,797	307	325	351	346	363	381	400	420	441	463	487	511
Overheads	1,028	66	69	72	74	78	82	86	90	95	100	105	110
Taxes	3,255	205	215	225	237	249	261	274	288	302	317	333	350
TransKarachi Total	**57,401**	**3,674**	**3,851**	**4,041**	**4,207**	**4,405**	**4,612**	**4,829**	**5,057**	**5,295**	**5,545**	**5,806**	**6,080**

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUT 1.4 - RED LINE – OPERATIONAL PLAN

May 2019

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

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1. Introduction

The objective of this output is to present the Operational Plan for the Red Line of the Karachi BRT System.

Appendix B – Red Line: Operational plan Model is divided in six chapters that assist the reader to better understand how the operational plan was elaborated and how it works. The chapters are as following:

1. Introduction
2. BRT Services Route Network
3. Inputs for BRT Services Operational Plans
4. BRT Red Line Operational Plan
5. Maintenance Plan for Fleet
6. Recommendations for Operational Plan Implementation

Chapter 2 explains the criteria adopted in the definition of the route plan and the general context of the Red Line project, followed by the presentation of the current route plan itself. As several scenarios were modelled in order to provide insights for the operational plan definition, such scenarios are explained in detail in chapter 4.

BRT Red Line Operational Plan presents the main information from the transport model that is applied in this stage, as well as the methodology that was used. With this information, the operational plan for each of the modelled scenarios is specified, and the applied methodology is explained. In chapter 5, the maintenance plan for the BRT fleet is presented and the recommendations for the Operational Plan Implementation, such as transition time and implementation strategy is described.

2. BRT Services Route Network

The BRT route network proposed for Karachi BRT considers the concept of 'Direct-services', where BRT services can run on and off-corridor, connecting the main origins and destinations. This route design promotes time savings for the users, as it reduces the necessity of transfers between BRT services. It also does not require many transfer stations, in contrast to other configurations, thus it can promote infrastructure cost savings due to less terminals and intermediate transfer stations.

In order to promote a high level of service for the direct services, it is recommended to take some actions, especially in the off corridor sections, to minimize delays and preserve scheduling standards. The operational control centre, supported by the necessary ITS infrastructure, should monitor the operation in real time on a daily basis. With this, measures to mitigate the impact of disturbances in the system (e.g. traffic accidents) can be taken in real time. Furthermore, infrastructure improvements in off corridor sections and favourable public transport policies, such as high quality pavement and preferential bus lane, lead to an increase on average service speed.

The following figure presents the Red Line corridor, the common corridor (which will serve Green, Red, Blue and Yellow Line) and other public transport projects in Karachi, clarifying the context in which the Red Line project is inserted.

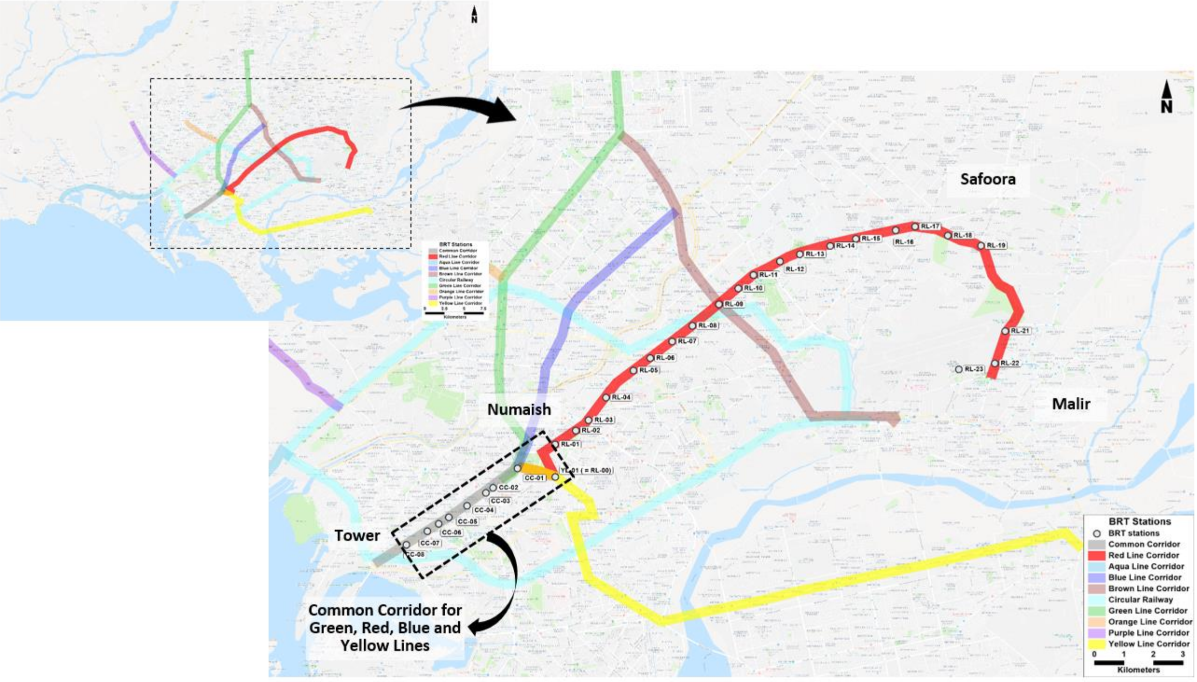

Figure 1: Red Line and other public transport projects in Karachi

The following figure presents the complete route plan for Red Line.

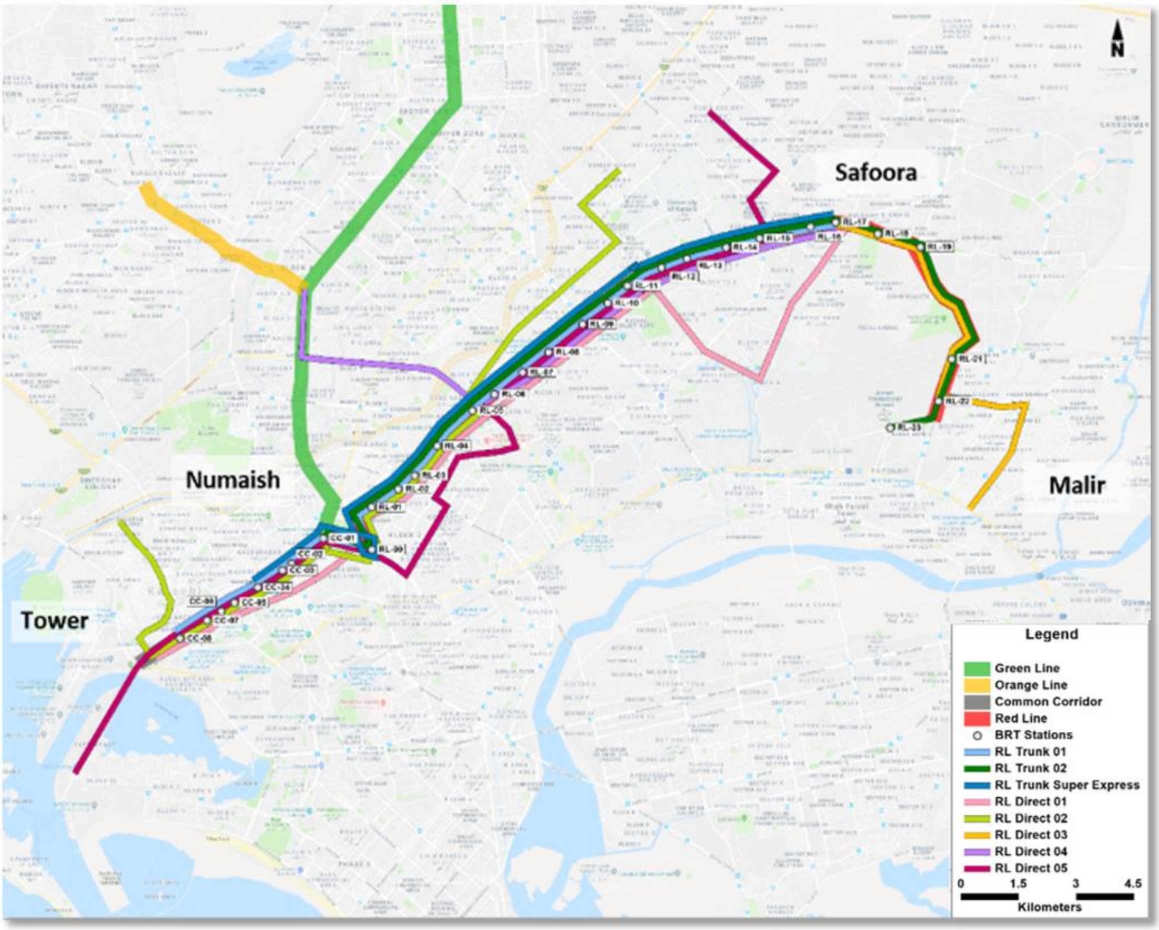

Figure 2.2: BRT Routes of Red Line

The Red Line corridor will present two types of services: the first one will be the express service, which will stop only at the most demanded stations – the stations that attract the greatest number of users for the system. The second type will be the stopping services, which will stop at all stations of the corridor.

The basis to the route selection for each BRT service were the surveys conducted in Karachi (Frequency and Occupancy survey and Origin and Destination survey, on-board and stop-based), presented in Appendix A of Interim Report 1. In addition, the current public transportation routes (seeking to maintain the public transport coverage with the BRT system) and the discussions among the involved parties were also considered. The proposed routes have proven by the modelling data that will carry a great number of passengers. All proposed routes are presented in the following items.

2.1 Routes of Red Line corridor

The proposed routes for the Red Line operation are presented in Figure 2.3 to Figure 2.10, followed by Figure 2.11 showing the configuration of the off-corridor bus stops and terminals.

The detailed Red Line Route Plan & Bus Stops can be found in KMZ format as part of Appendix B.1 - Operational Plan.

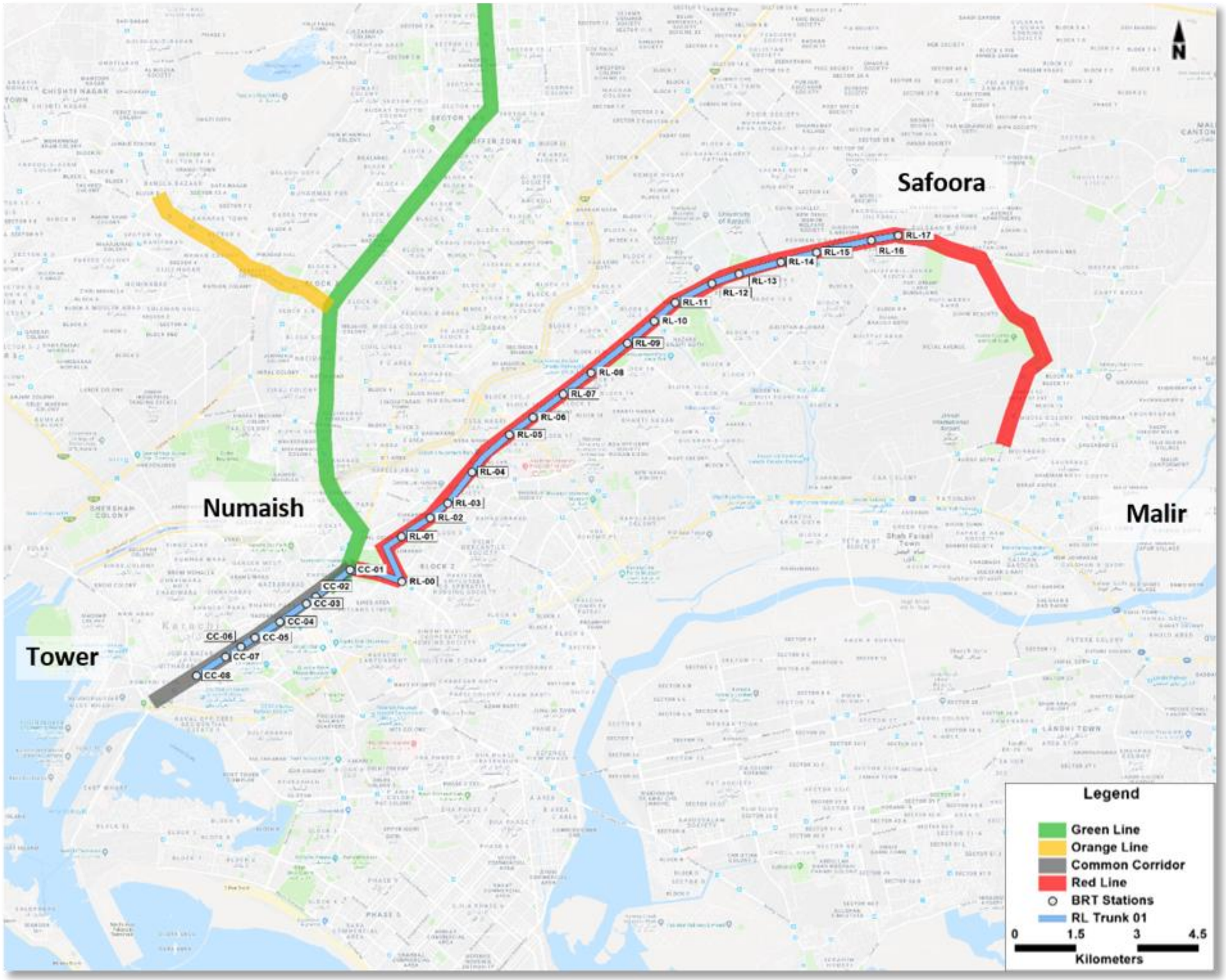

Figure 2.3: Red Line – Trunk Service 01

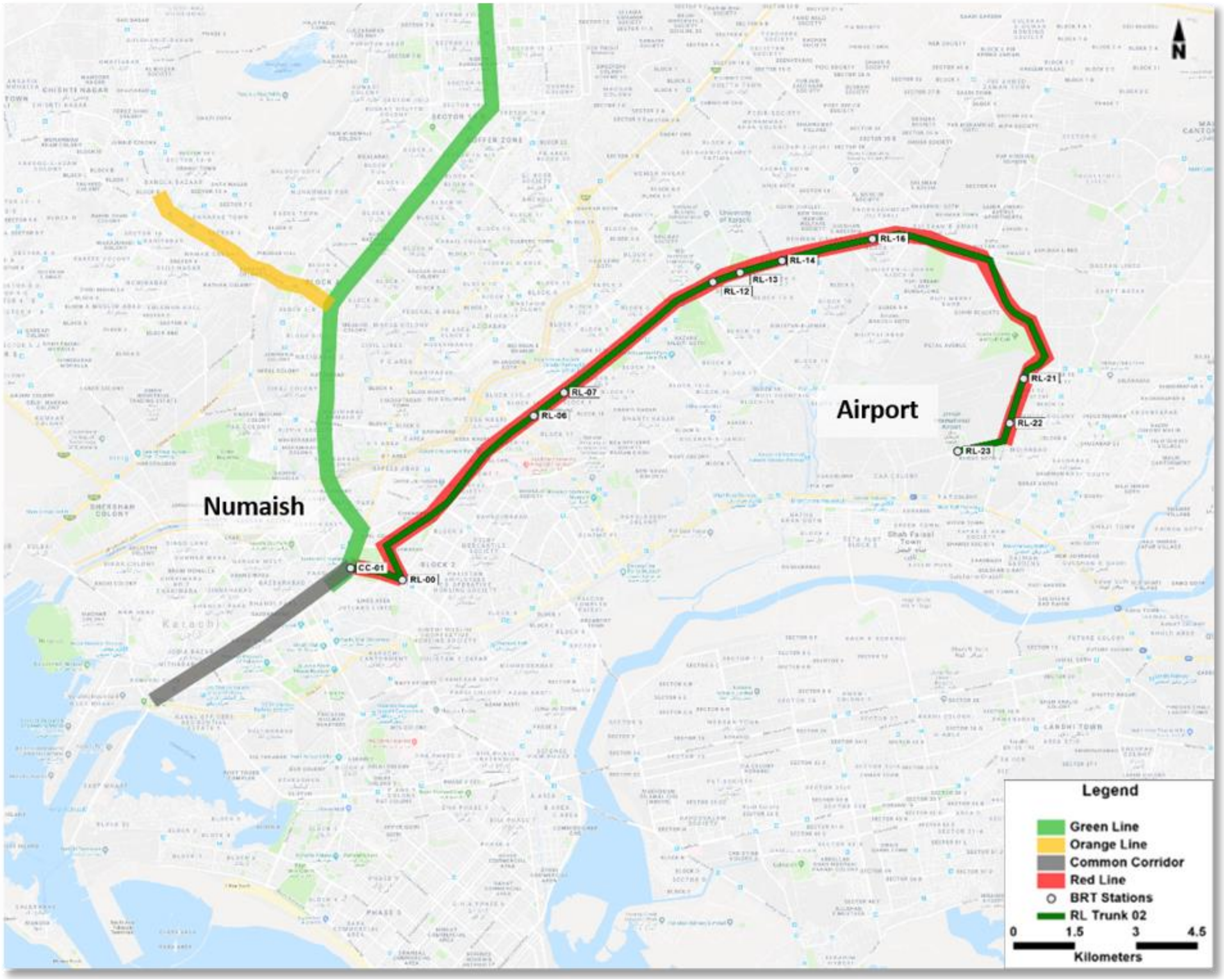

Figure 2.4: Red Line – Trunk Service 02

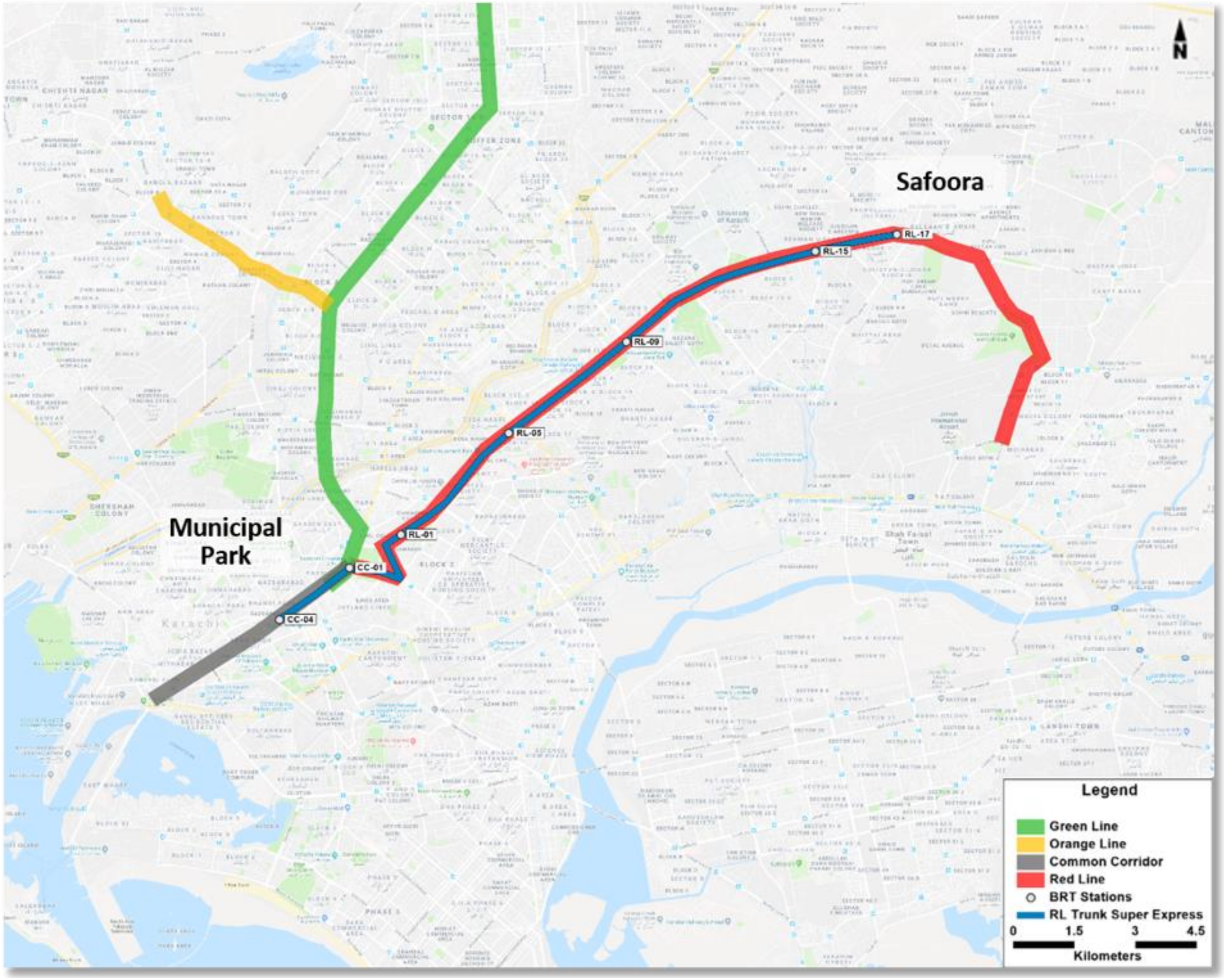

Figure 2.5: Red Line – Trunk Super Express

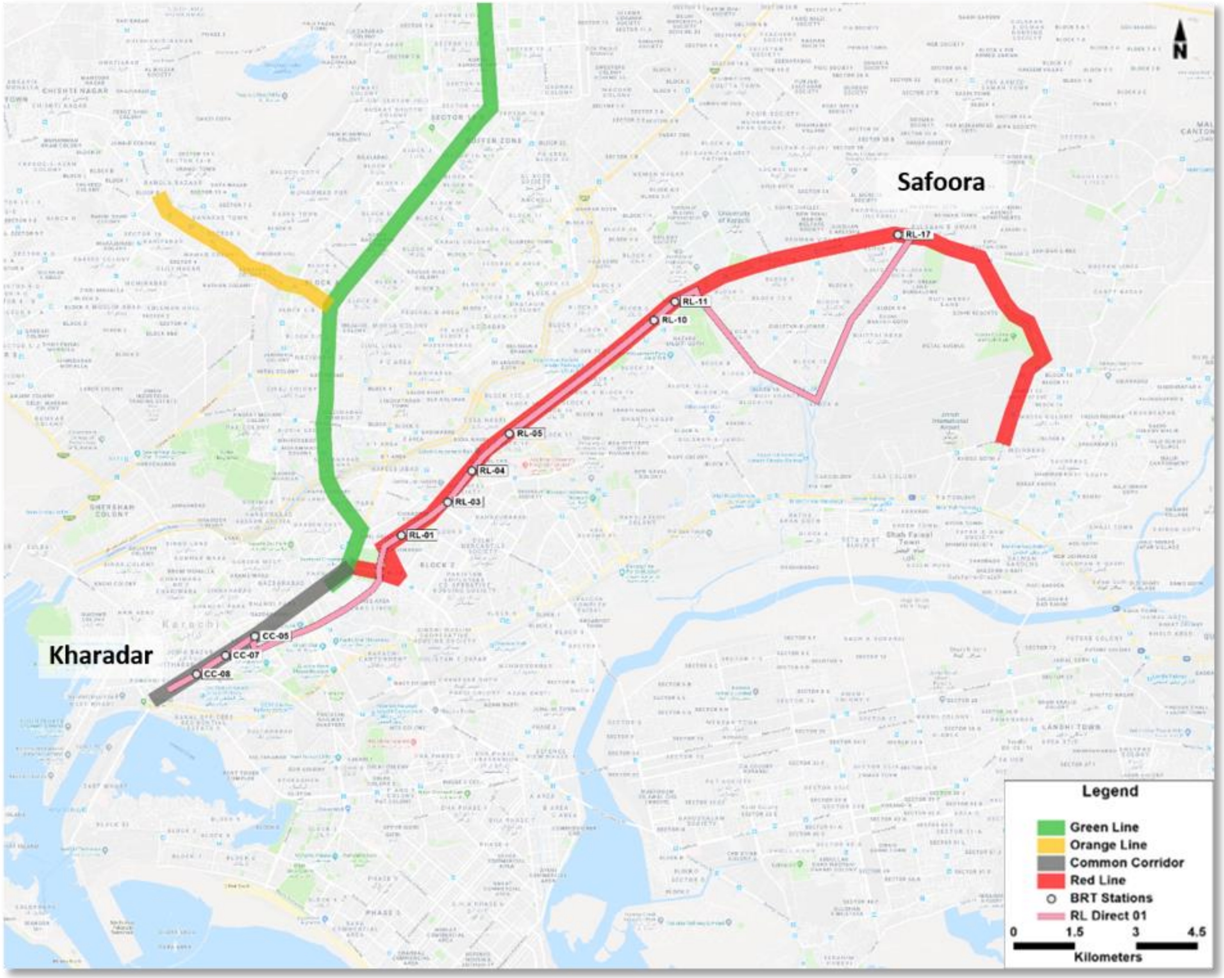

Figure 2.6: Red Line – Direct Service 01

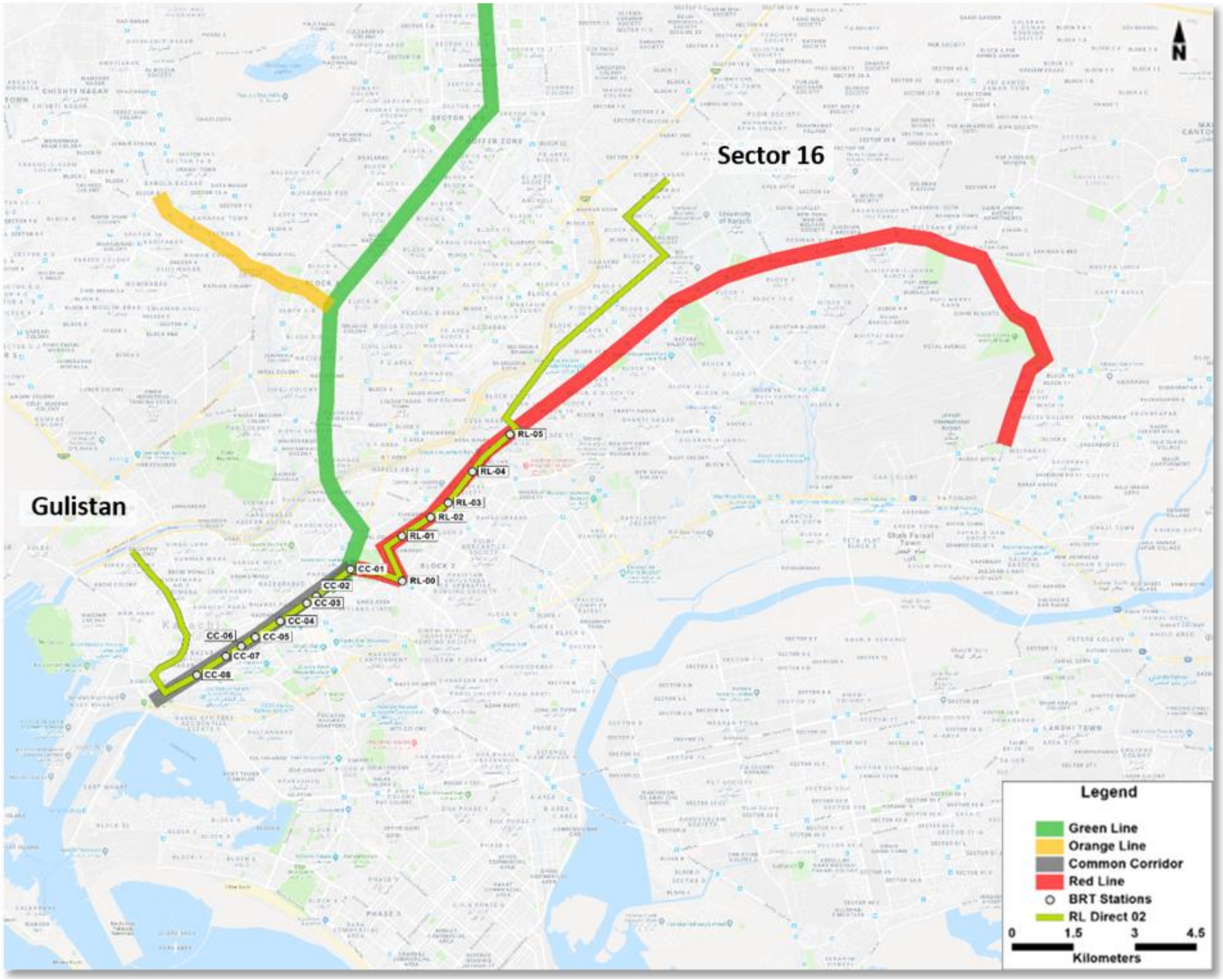

Figure 2.7: Red Line – Direct Service 02

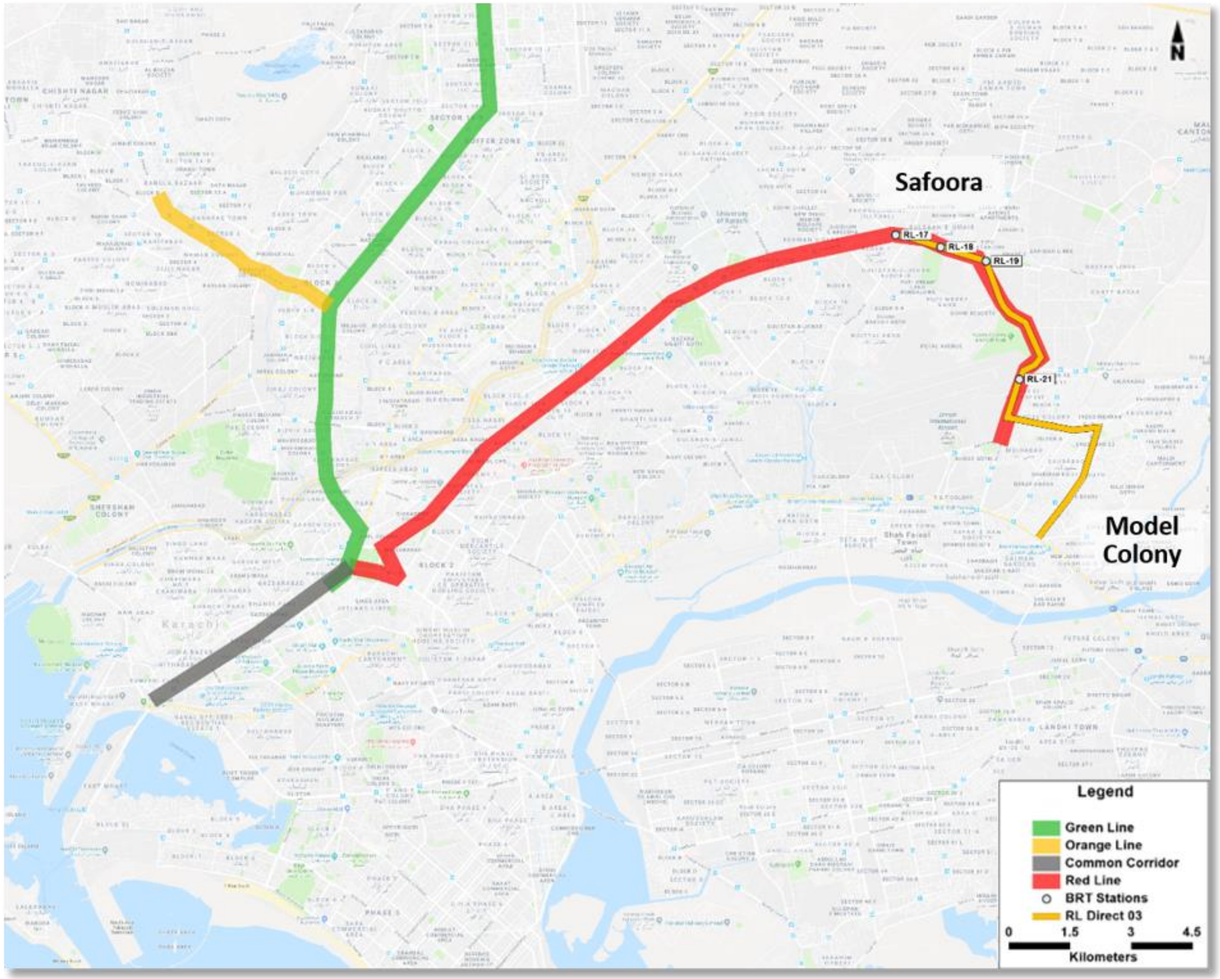

Figure 2.8: Red Line – Direct Service 03

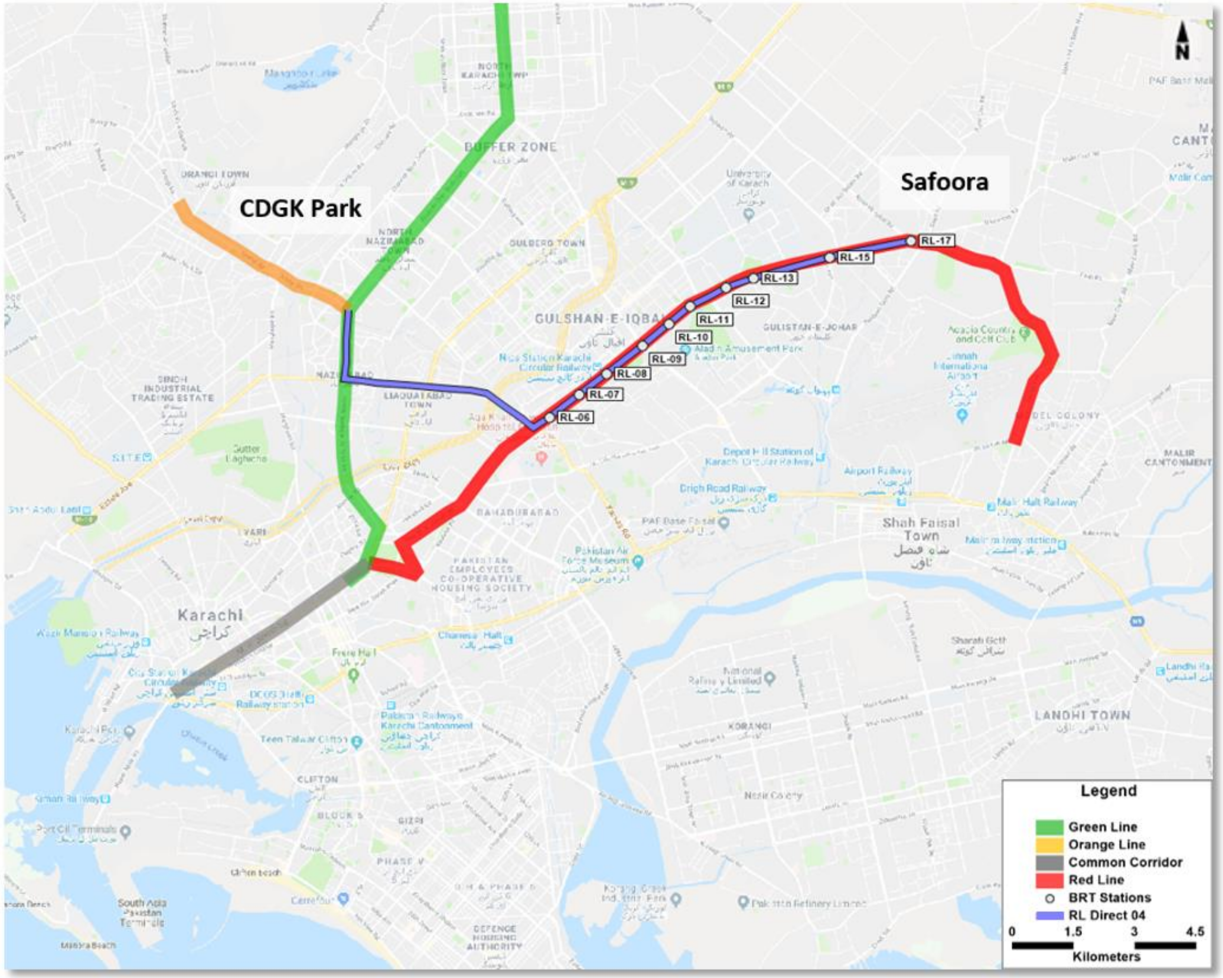

Figure 2.9: Red Line – Direct Service 04

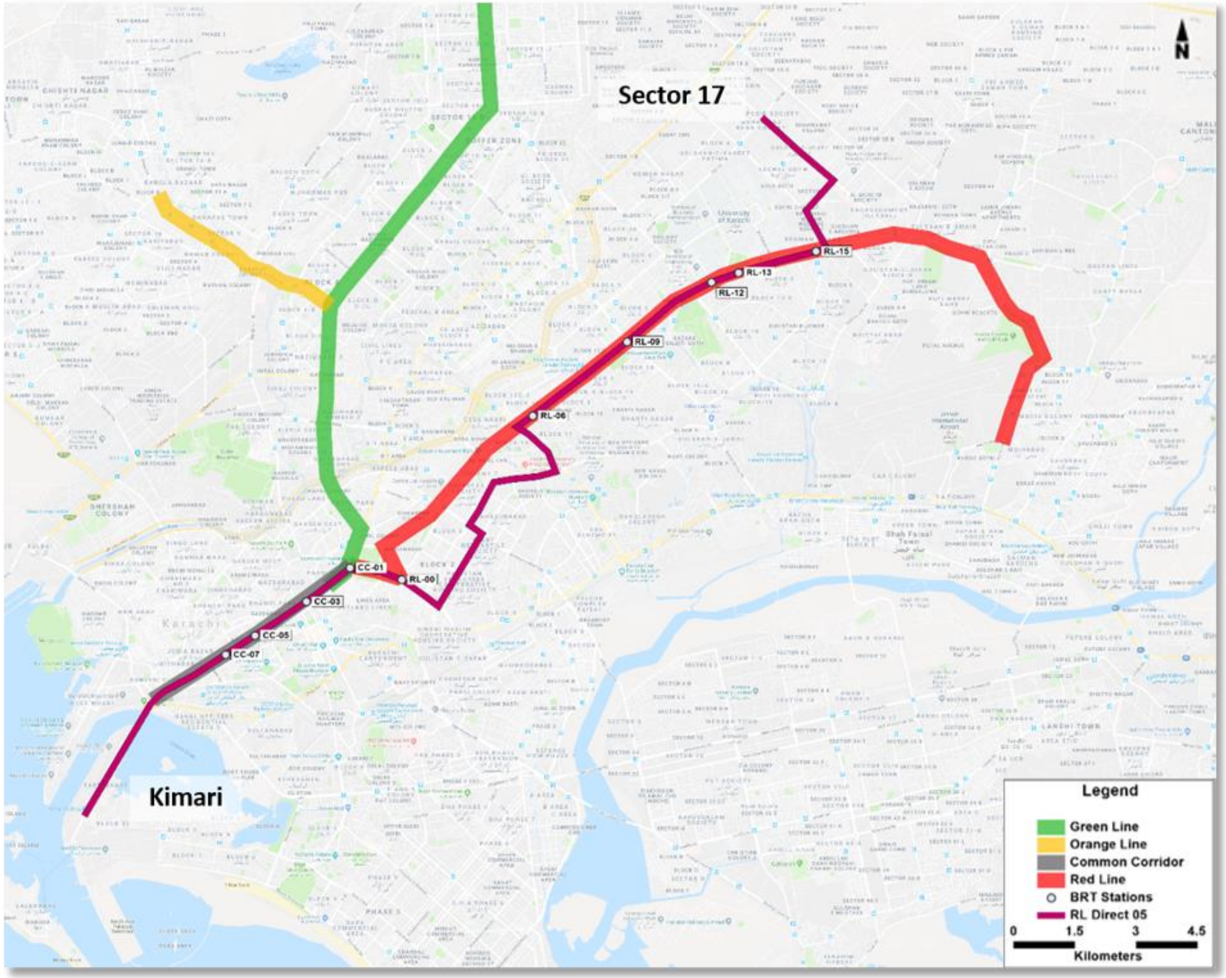

Figure 2.10: Red Line – Direct Service 05

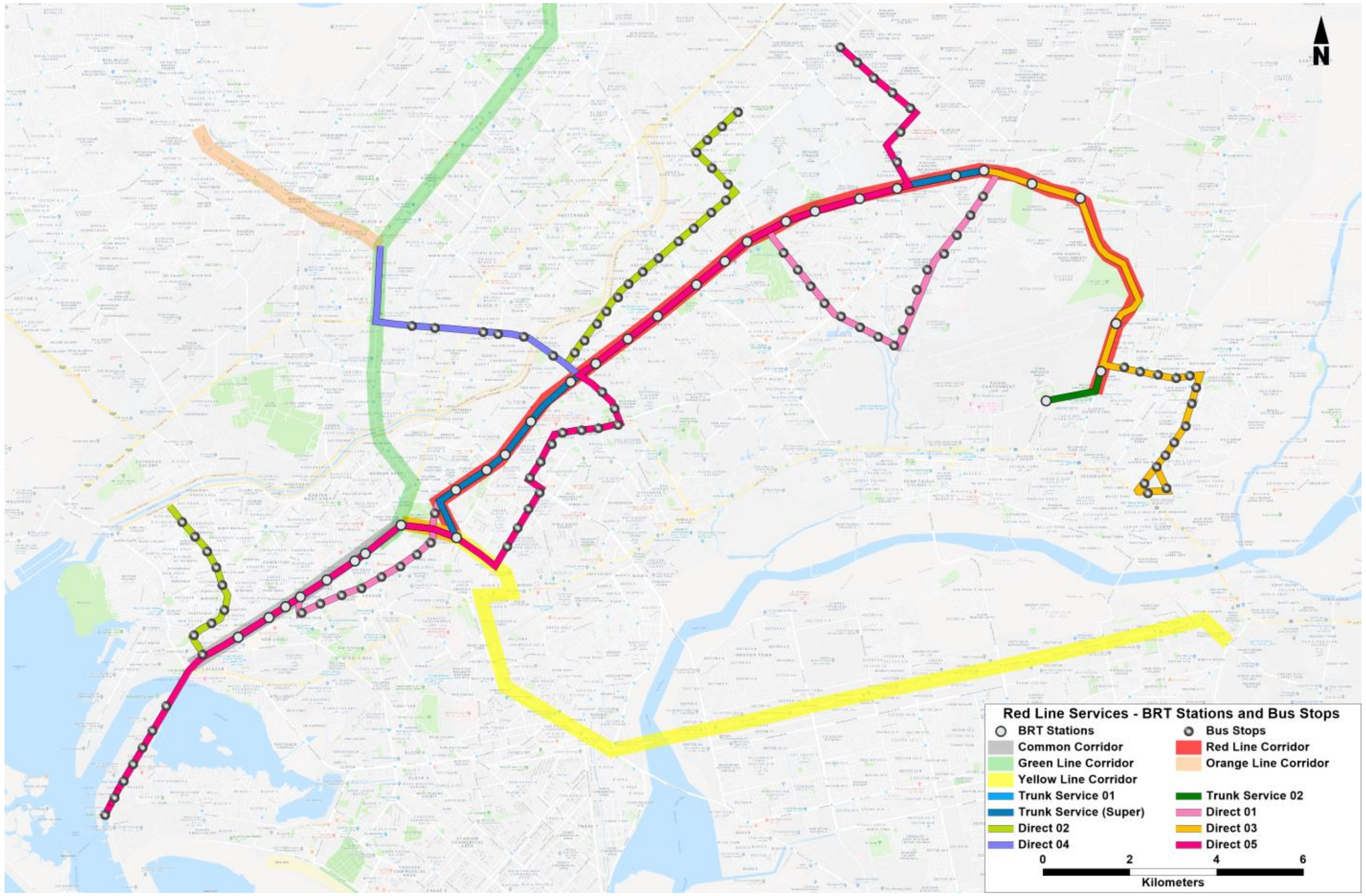

Figure 2.11: Off-corridor bus stops and terminals

2.2 Impacts on the current public transportation services

Due to the implementation of the new BRT system in Karachi, the current public transportation system, composed primarily of Coaches, Mini Buses and Large Buses, will be reduced. The operation of these services that run in the BRT corridor will cease with the start-up of the system, as detailed in the Bus Industry Restructuring Plan. All current public transportation routes of Karachi, including an evaluation of the percentage level of interference with the BRT corridor, are detailed in Interim Report 1 – Appendix A, item 3.3.

The start-up of the BRT operation will result in changes on the existing routes, such as the shortening, removal or re-routing of some routes. The following table summarizes the changes in the current public transportation routes with the implementation of the Red Line Corridor. The Red Line Revised Public Transport Routes (KMZ file) are also presented in the digital annex Appendix B.1 - Operational Plan, which presents in detail all affected routes.

Table 2.1: Impact over existing public transportation routes due to the implementation BRT Corridor

Route	Status
11-C	Shortened
G-11	
G-13	
G-17	
G-19	
G-27	
G-3	
G-7	
GulistaN Coach	
S-2	
Safari Coach	
Sheraz Coach	

Route	Status
Super HasaN Zai C	Shortened
M-1	
Star Line	
UTS-12	
A-3	Re-routed
Data Coach	
F-11	
G-25	
X-23	
Masood Coach	Split and Shortened
4-M	Removed

Due to this transition on the public transportation system, a great number of vehicles will need to be scrapped as part of the implementation of the BRT services. The scrapping plan aims to avoid that the removed buses start to operate illegally competing with the BRT services, which could reduce the BRT demand and decrease the fare revenue to pay the operational costs.

3. Inputs for BRT Services Operational Plans

3.1 Modelled scenarios

The modelled scenarios were based on combinations of different premises for:

- Route plan
    - Several route plans were evaluated during the decision making process, and the one presented in this report is the result of this optimization process
- Fare Structure (FS)

  - Higher and lower fare structures were evaluated for a better understanding of the population behaviour when facing different BRT costs
- Fleet composition (FC)
  - The analysis considered 9m, 12m and 18m buses to be used in the different services, and the combinations presented in this report are the result of this process

The model considers the operation of Green and Orange lines and their influence in the transportation demand in Karachi. The fleet compositions for the modelled scenarios are summarized in the following table.

Table 3.1: Modelled scenarios

Fleet Composition for the evaluated scenarios	
FC ID	**Description**
FC 1	Trunk services: 18m
	Direct services (except Direct service 3): 12m
	Direct service 03[1]: 9m
FC 2	Trunk services: 18m
	Direct services: 12m

The modelled fare structures are explained in detail in item 3.2.2, and in summary are the following:

- FS from 15 to 55 PKR, with 5 PKR increases every 2km
- FS from 10 to 40 PKR, with 5 PKR increases every 5km
- FS from 20 to 50 PKR, with 5 PKR increases every 5km

3.2 Demand transport modelling

In order to develop the Operational Plan, it is necessary to input information both from surveys and from the transport model. The following items present the process for obtaining such information.

3.2.1 Demand data from Complementary surveys

The modelling process aims to create a simulated scenario of the whole city for a specific period of time, which is, for this project, one hour within the morning peak period[2]. As a natural consequence, not only the inputs for the modelling must refer to this time, but all outputs must also refer to this specific hour of general weekday.

In order to develop the Operational Design for the whole day, not only for weekdays but also for Saturday and Sunday, it is necessary to relate the peak hour of a typical weekday with all other hours of all other days, which is done by analysing the Frequency and Occupancy Survey.

---

[1] Direct service 03 was adjusted to meet specific traffic conditions in Model Colony

[2] As presented on Interim Report 1, Appendix B, the morning peak refers to the period from 7AM to 10AM.

For two locations the frequency and occupancy survey was conducted on a weekday, a Saturday and a Sunday (FOV-04 and FOV-40), and for two other locations it was conducted on five weekdays, a Saturday and a Sunday (FOV-05 and FOV-35), as presented in the following map.

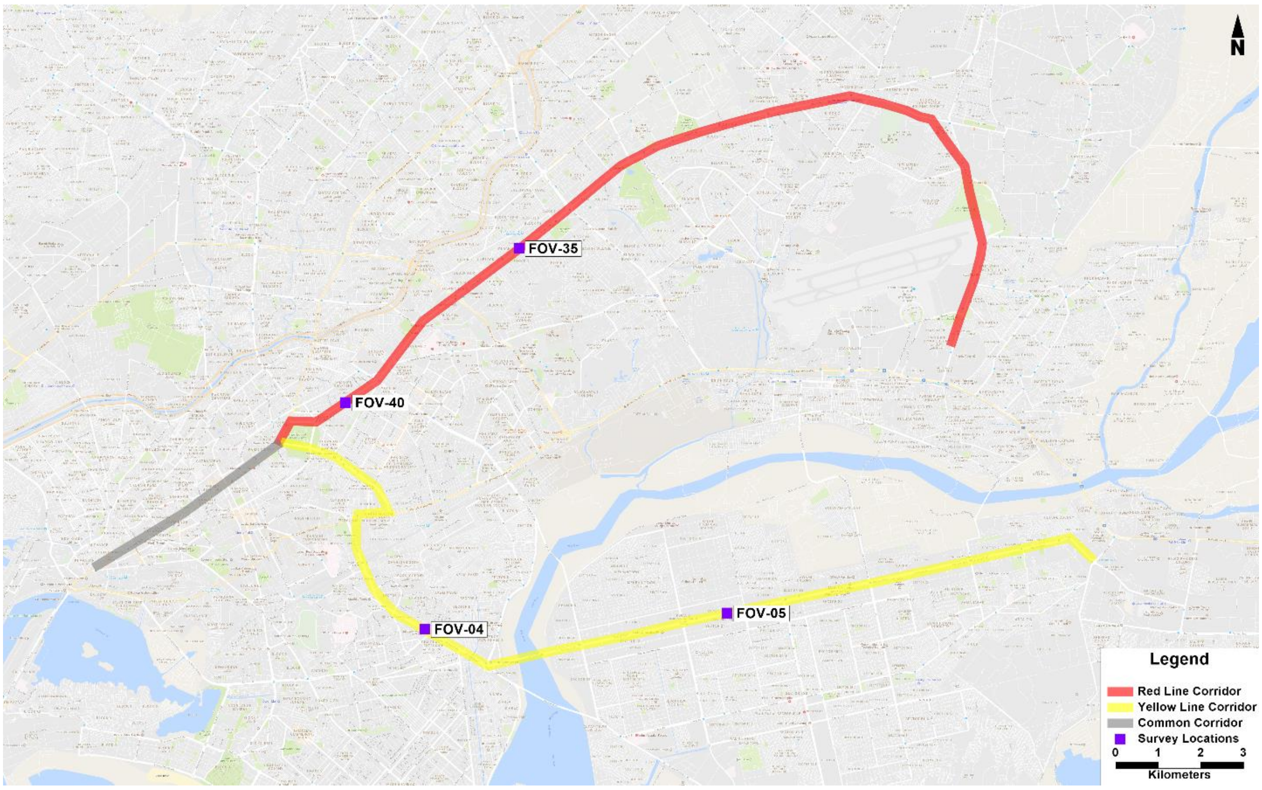

Figure 3.1: Frequency and Occupancy survey locations analysed

With information from the frequency and occupancy survey for the four locations, it was possible to develop the peak factor. This factor is obtained by comparing each hour, of each day (Weekday, Saturday and Sunday), with the volume of the peak hour. With this, it is possible to obtain the daily pattern for each day based on the peak hour, as presented in the following figures.

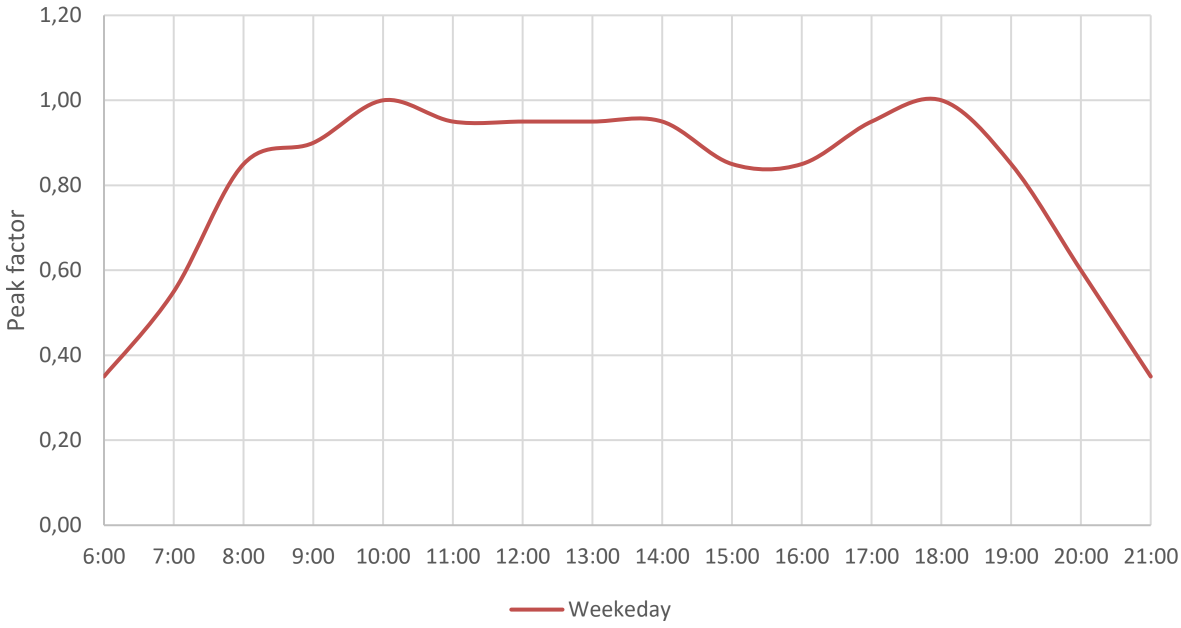

Figure 3.2: Daily peak factor for a typical Weekday

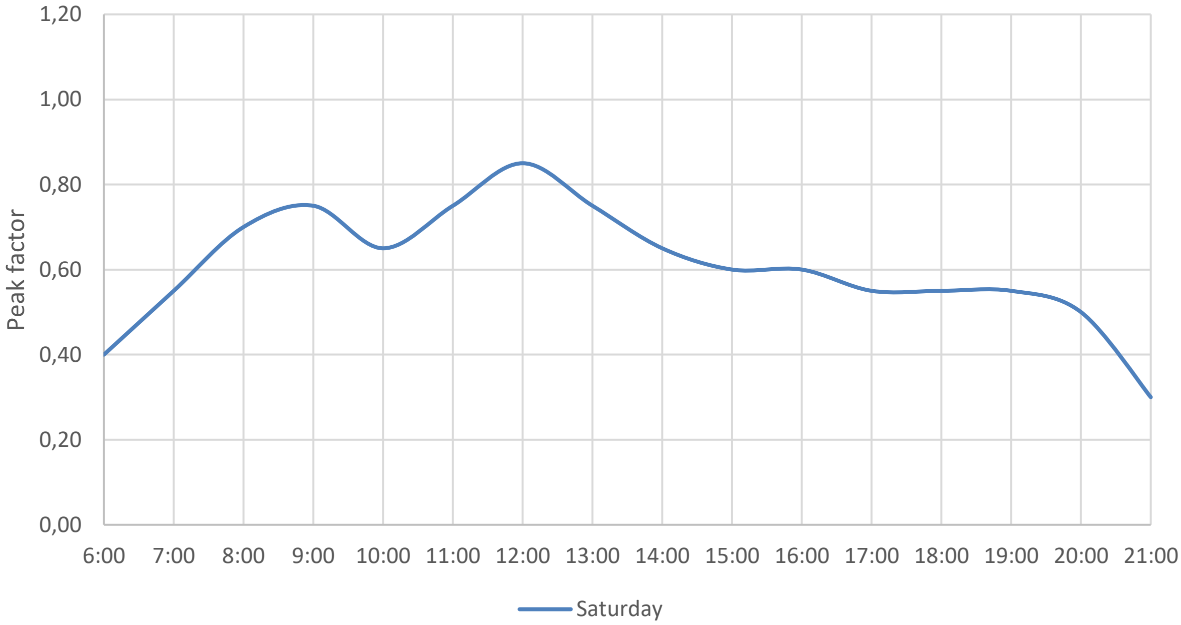

Figure 3.3: Daily peak factor for a typical Saturday

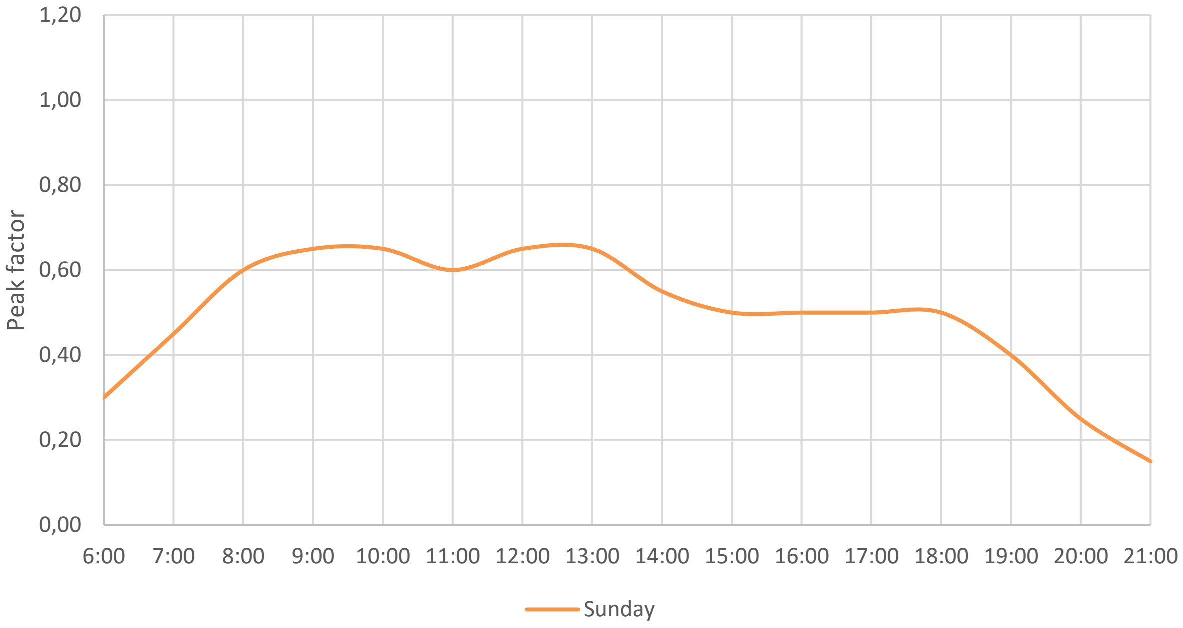

Figure 3.4: Daily peak factor for a typical Sunday

With this daily peak factor, it was possible to obtain the total daily factor, which is how many times the peak volume happens within a day (total daily volume divided by peak hour volume). In addition, it was possible to obtain the yearly factor, which correlates how many weekdays happen within a whole year. All this information is presented in the table below.

Table 3.2: Expansion factors for Karachi

Period	Factor	Unit
Weekday	12.9	Daily volume/peak volume
Saturday	9.70	Daily volume/peak volume
Sunday	7.90	Daily volume/peak volume
Year	304	Yearly volume/daily volume

3.2.2 Fare Structure

The BRT demand is directly affected by the adopted fare structure, and this item presents the modelled fare structures and the existing services fare structure.

In Karachi, the public transportation routes are composed of three different types of vehicles: Coaches, Mini Buses and Large Buses. All of the three vehicle types run under the same fare structure, which is the distance based structure shown in the following figure

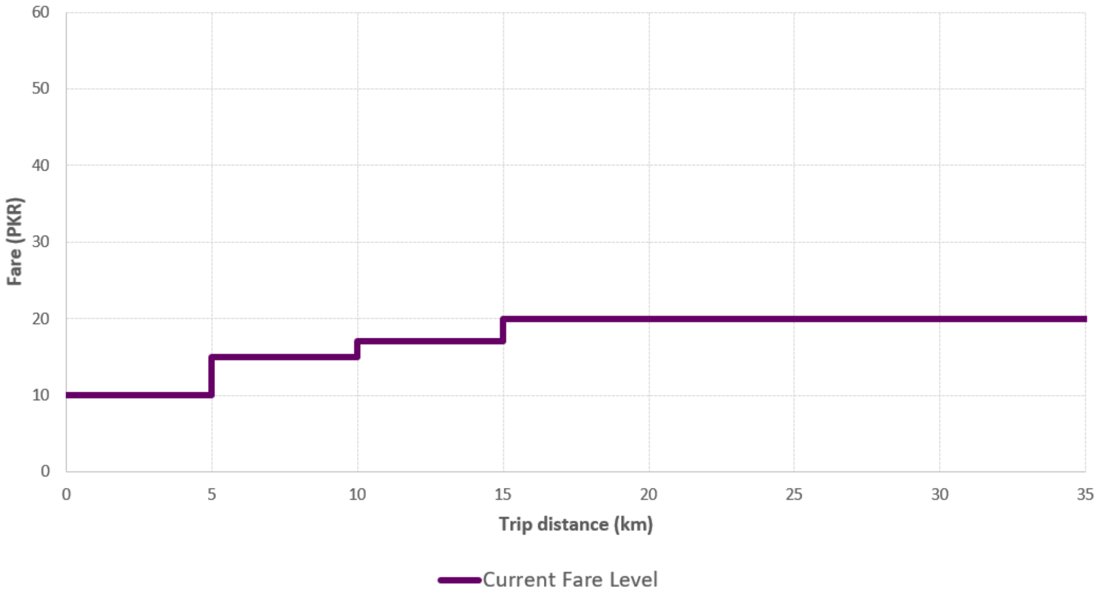

Figure 3.5: Current fare structure of Coaches, Mini Buses and Large Buses

Since BRT customers are price sensitive, three Fare Structures (FS) have been simulated in the transport demand model for financial analysis of the proposed operational design scenarios. With that being said, as higher the price gets, lower passenger uses the system. The following figure presents the Fare Structures considered for simulation. It should be noted that all BRT lines of the system are expected to operate based on the same fare structure.

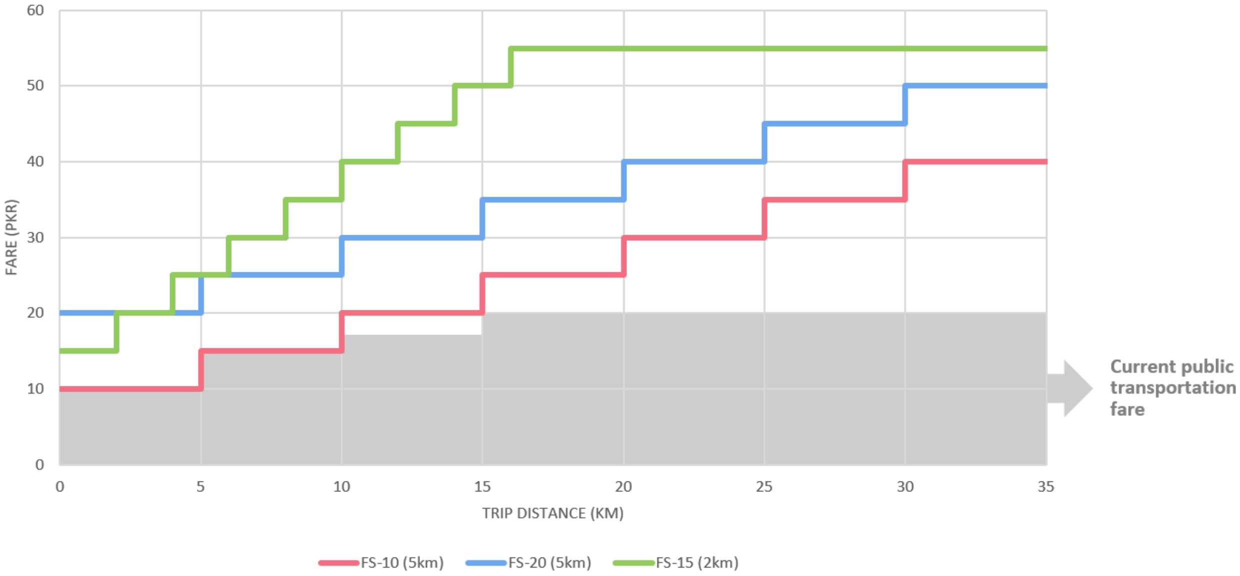

Figure 3.6: Fare Structures scenarios for modelling purposes

In summary, the are three modelled fare structures:

- FS 15-55 PKR with 5 PKR increase every 2km
- FS 10-40 PKR with 5 PKR increase every 5km
- FS 20-50 PKR with 5 PKR increase every 5km

This information affects directly on the results from the transport modelling. For example, if the fare is low, it is highly likely that several people will use the BRT. On the other hand, if there is a high fare, it is highly likely that several people will choose to do their travels by walk, or by alternative transport modes, such as rickshaws, for example. Hence, the fare structure has direct impact on the maximum load that comes from the transport model, which thus impacts on the final fleet required for operating the system.

3.2.3 Modal Shift

The demand for passengers using the BRT considers, in addition to the current users of the public transport system, the migration from users of Rickshaw, Private Cars and Motorcycles.

The Rickshaw, Private Cars and Motorcycle demand matrices were obtained from the matrix estimation procedure based on the field volume counts surveys, and then it was considered that a portion of these current demand would migrate to BRT services.

The proportion of each Origin-Destination pair was determined on the basis of a Logit discrete choice model, calibrated from data obtained on the willingness to pay survey. In order to develop this discrete model, the first step was to develop two Utility functions (U) for the analysed mode (Rickshaw, Private Cars and Motorcycle) and the BRT.

With this both functions, the Logit discrete choice model was then developed, with the probability P of choosing one of the modes, as per the presented below.

3.2.3.1 Passengers from Rickshaw

Utility functions (U) for Rickshaw and BRT:

$$U_{Rickshaw} = -0.0716232 \, . Cost_{Rickshaw} + 0.0716232 \, . Cost_{BRT}$$

$$Cost_{Rickshaw} = 10.56 \; PKR/km$$

$$U_{BRT} = -1.40037 - 0.119097 \, . Time_{BRT}$$

Probability P of choosing one of the modes:

$$P_{Rickshaw} = \frac{e^{U_{Rickshaw}}}{e^{U_{Rickshaw}} + e^{U_{BRT}}}$$

$$P_{BRT} = \frac{e^{U_{BRT}}}{e^{U_{Rickshaw}} + e^{U_{BRT}}}$$

3.2.3.2 Passengers from Private Cars

Utility functions (U) for Private Cars and BRT:

$$U_{Private\ Cars} = -0.00495077 \, . Cost_{Private\ Cars} + 0.00495077 \, . Cost_{BRT},$$

$$Cost_{Private\ Cars} = 14.12 \; PKR/km$$

$$U_{BRT} = -0.807213 - 0.0837987\,.Time_{BRT} + 0.0837987\,.Time_{Private\ Cars}$$

Probability P of choosing one of the modes:

$$P_{Private\ Cars} = \frac{e^{U_{Private\ Cars}}}{e^{U_{Private\ Cars}} + e^{U_{BRT}}}$$

$$P_{BRT} = \frac{e^{U_{BRT}}}{e^{U_{Private\ Cars}} + e^{U_{BRT}}}$$

3.2.3.3 Passengers from Motorcycles

Utility functions (U) for Motorcycles and BRT:

$$U_{Private\ Cars} = -0.0778283\,.Cost_{Motorcyle} + 0.0778283\,.Cost_{BRT}$$

$$Cost_{Motorcyle} = 1.91\ PKR/km$$

$$U_{BRT} = -0.201529 - 0.0916158\,.Time_{BRT} + 0.0916158\,.Time_{Motorcyle}$$

Probability P of choosing one of the modes:

$$P_{Motorcyles} = \frac{e^{U_{Motorcyles}}}{e^{U_{Motorcyles}} + e^{U_{BRT}}}$$

$$P_{BRT} = \frac{e^{U_{BRT}}}{e^{U_{Motorcyles}} + e^{U_{BRT}}}$$

3.2.4 Demand data from Transport model

The current transport demand along the proposed BRT corridors is estimated between 278,600 and 418,500 passengers per day depending on the modelled scenarios. It should be noted that the model considers the effects of Green Line and Orange Line Corridors operation for the transport demand. For all scenarios, it was considered a 0% competition level between the BRT and other existing services in the corridor, due to the activities to be carried out as part of the Bus Industry Restructuring Program.

3.2.4.1 Scenario with FS 15-55 PKR (2km)

Considering the fare structure of 15-55 PKR (2km), the BRT system presents a daily demand of 278,600 passengers. The following table summarizes the composition of the BRT demand according to the modelled modal shift, therefore shows how much of the BRT demand comes from each of the other services type.

Table 3.3: Composition of the BRT demand

Other services	Composition of the BRT demand
Public transport	86.5%
Cars	7.7%
Motorcycles	3.6%

Other services	Composition of the BRT demand
Rickshaw	2.2%

The load profile for the BRT during the peak hour along the city, is presented in the following figure.

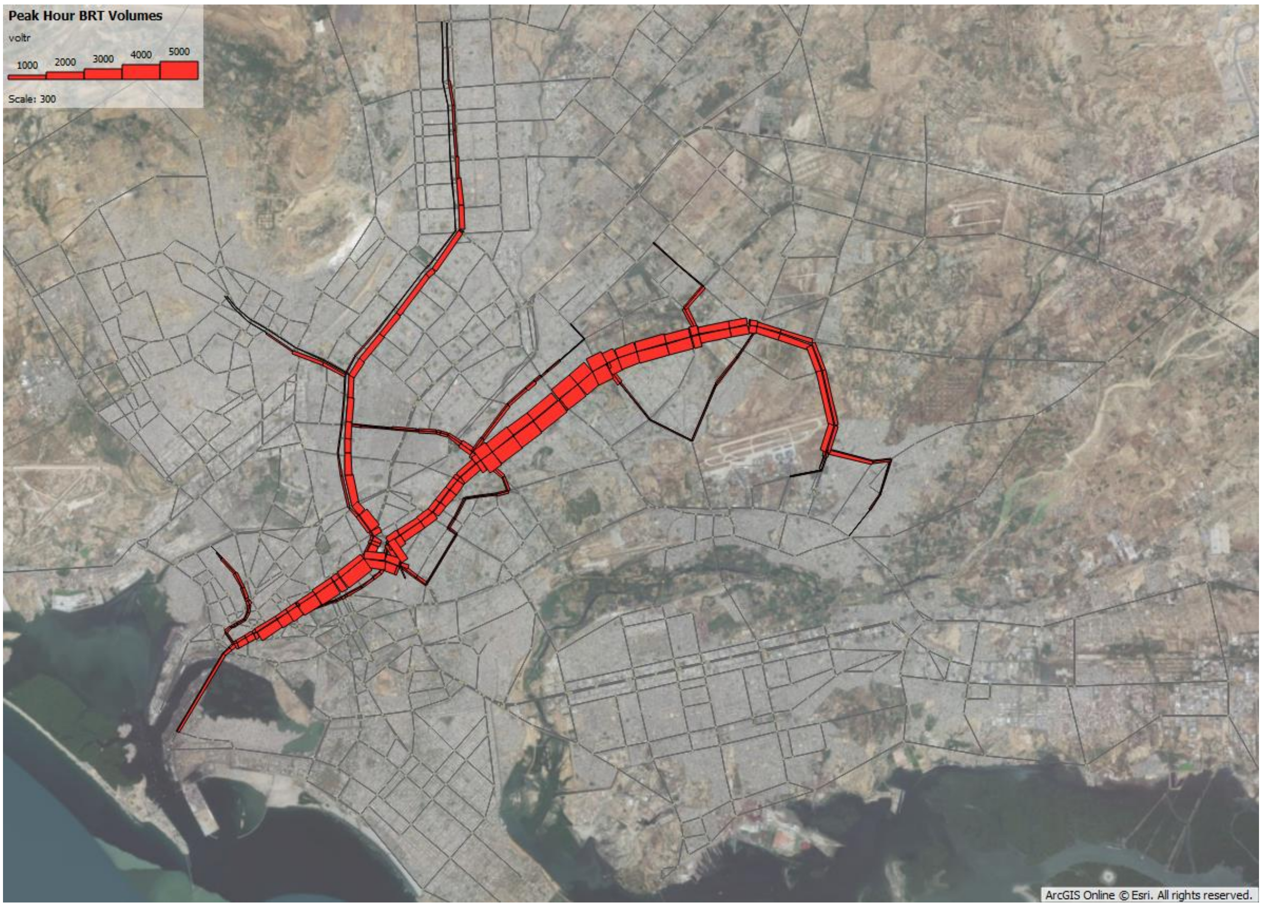

Figure 3.7: Passenger peak hour volumes on BRT services (FS 15-55 PKR – 2km)

The following table summarizes the main outputs of the transport model for all BRT routes

Table 3.4: Transport demand results per route

Route	Critical Load (pass/h)	Journey Time (min)	Length (km)	Boarding (pass/day)
RL Trunk 1	815	125	20	82,663
RL Trunk 2	1,097	128	25	30,818
RL Trunk Super	1,012	88	18	26,342
RL Direct 01	562	167	24	61,804
RL Direct 02	615	190	23	49,110
RL Direct 03	523	163	13	26,922
RL Direct 04	614	106	16	49,059
RL Direct 05	730	201	29	80,573

It should be noted that the 15-55 PKR (2km) fare structure is considerably higher than the current public transport services fare structure. This has a significant effect especially for trips shorter than 10km, which is the range where most trips occur (near 75% of all trips fall within this range), and where the BRT fare is on average 2 times the current fare.

As the population has a limited financial capacity of absorbing higher fares than the current ones, high BRT fare structures in comparison to the existing services might inhibit some trips, which is the opposite of what the BRT purpose is. It might also lead to the rise of new affordable informal private transportation to attend lower income population and, if this happens, this would be an unpredicted competition that could potentially affect the BRT operation.

3.2.4.2 Scenario with FS 10-40 PKR (2km)

Considering the fare structure of 10-40 PKR (5km), the BRT system presents a daily demand of 418,500 passengers. The following table summarizes the composition of the BRT demand according to the modelled modal shift, therefore shows how much of the BRT demand comes from each of the other services type.

Table 3.5: Composition of the BRT demand

Other services	Composition of the BRT demand
Public transport	86.9%
Cars	5.4%
Motorcycles	5.0%
Rickshaw	2.7%

The load profile for the BRT during the peak hour along the city, is presented in the following figure.

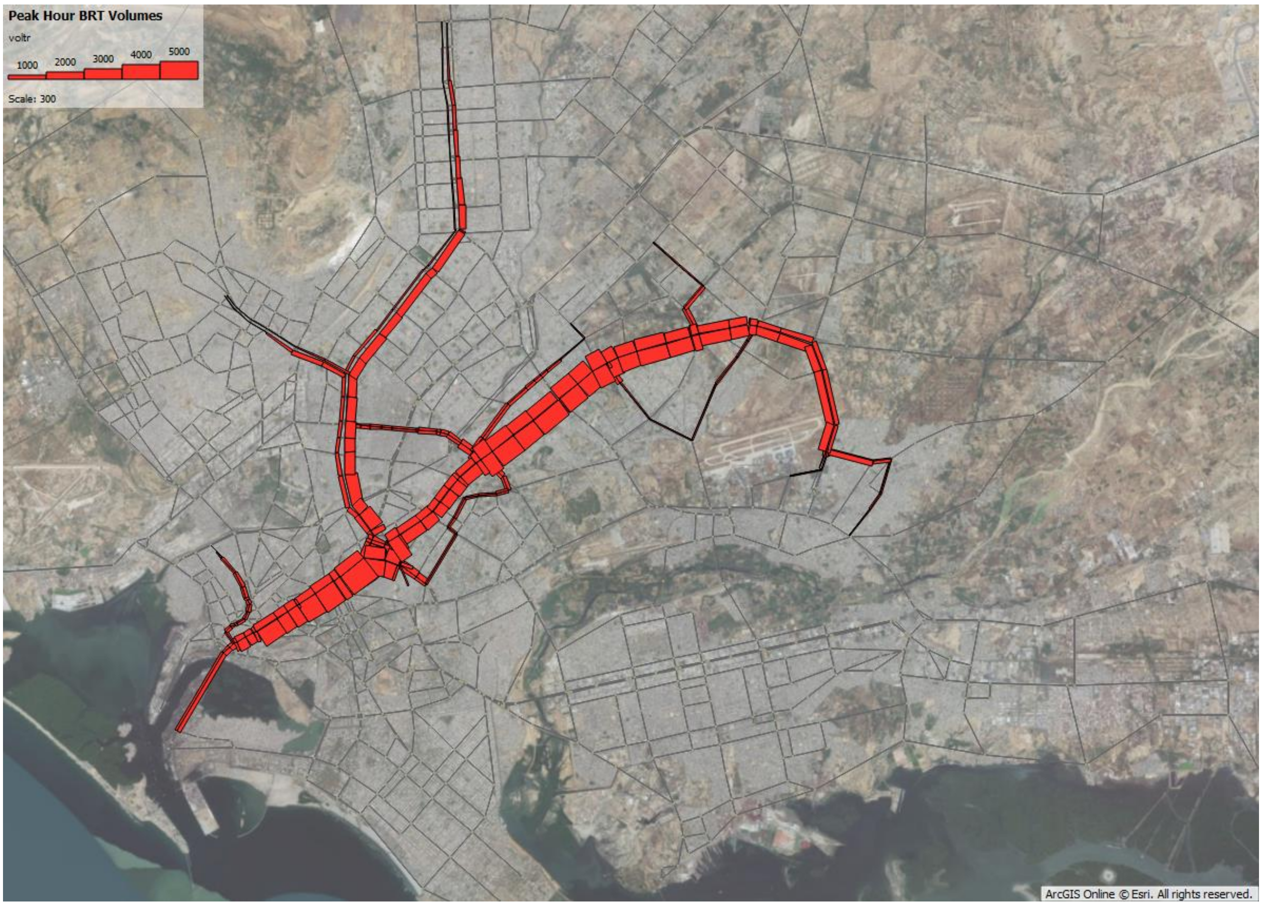

Figure 3.8: Passenger peak hour volumes on BRT services (FS 10-40 PKR – 5km)

The following table summarizes the main outputs of the transport model for all BRT routes

Table 3.6: Transport demand results per route

Route	Critical Load (pass/h)	Journey Time (min)	Length (km)	Boarding (pass/year)
RL Trunk 1	1,294	125	20	118,009
RL Trunk 2	1,373	128	25	36,597
RL Trunk Super	1,538	88	18	37,204
RL Direct 01	865	167	24	103,394
RL Direct 02	878	190	23	72,795
RL Direct 03	829	163	13	39,164
RL Direct 04	873	106	16	64,319
RL Direct 05	1,393	201	29	135,424

3.2.4.3 Scenario with FS 20-50 PKR (2km)

Considering the fare structure of 20-50 PKR (5km), the BRT system presents a daily demand of 285,500 passengers. The following table summarizes the composition of the BRT demand according to the modelled modal shift, therefore shows how much of the BRT demand comes from each of the other services type.

Table 3.7: Composition of the BRT demand

Other services	Composition of the BRT demand
Public transport	85.6%
Cars	7.5%
Motorcycles	4.6%
Rickshaw	2.3%

The load profile for the BRT during the peak hour along the city, is presented in the following figure.

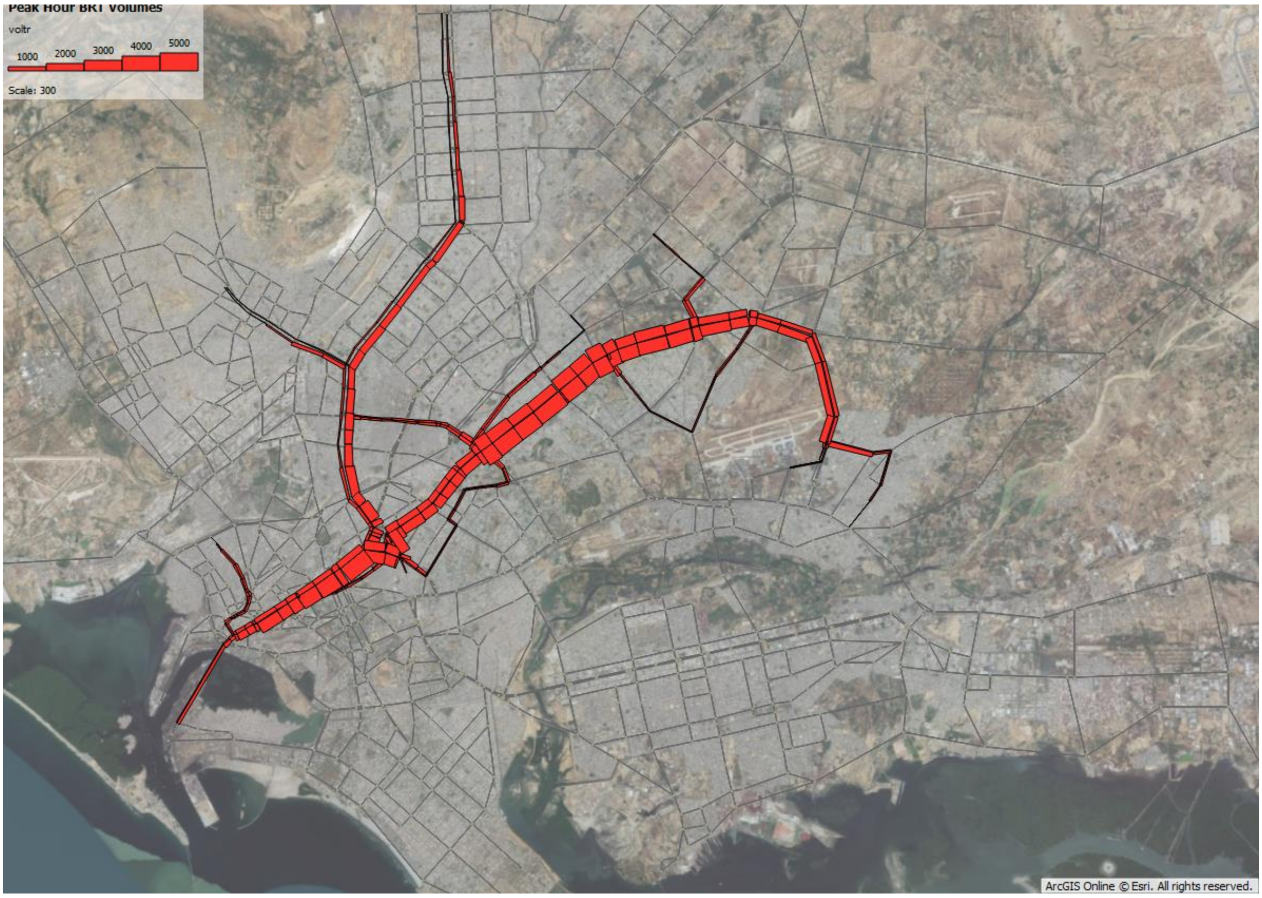

Figure 3.9: Passenger peak hour volumes on BRT services (FS 20-50 PKR – 5km)

The following table summarizes the main outputs of the transport model for all BRT routes

Table 3.8: Transport demand results per route

Route	Critical Load (pass/h)	Journey Time (min)	Length (km)	Boarding (pass/day)
RL Trunk 1	948	125	20	87,320
RL Trunk 2	1,243	128	25	34,262
RL Trunk Super	1,291	88	18	31,605
RL Direct 01	315	167	24	64,281
RL Direct 02	701	190	23	48,401
RL Direct 03	682	163	13	31,076
RL Direct 04	735	106	16	49,536
RL Direct 05	883	201	29	89,152

4. BRT Red Line Operational Plan

This item presents the premises and calculations for the operational plan definition, followed by a summary of the results for all modelled scenarios.

4.1 Methodology

In order to have a better understanding of the overall process to develop an Operational Plan, the following figure presents, schematically, the steps for designing the operation of a BRT system.

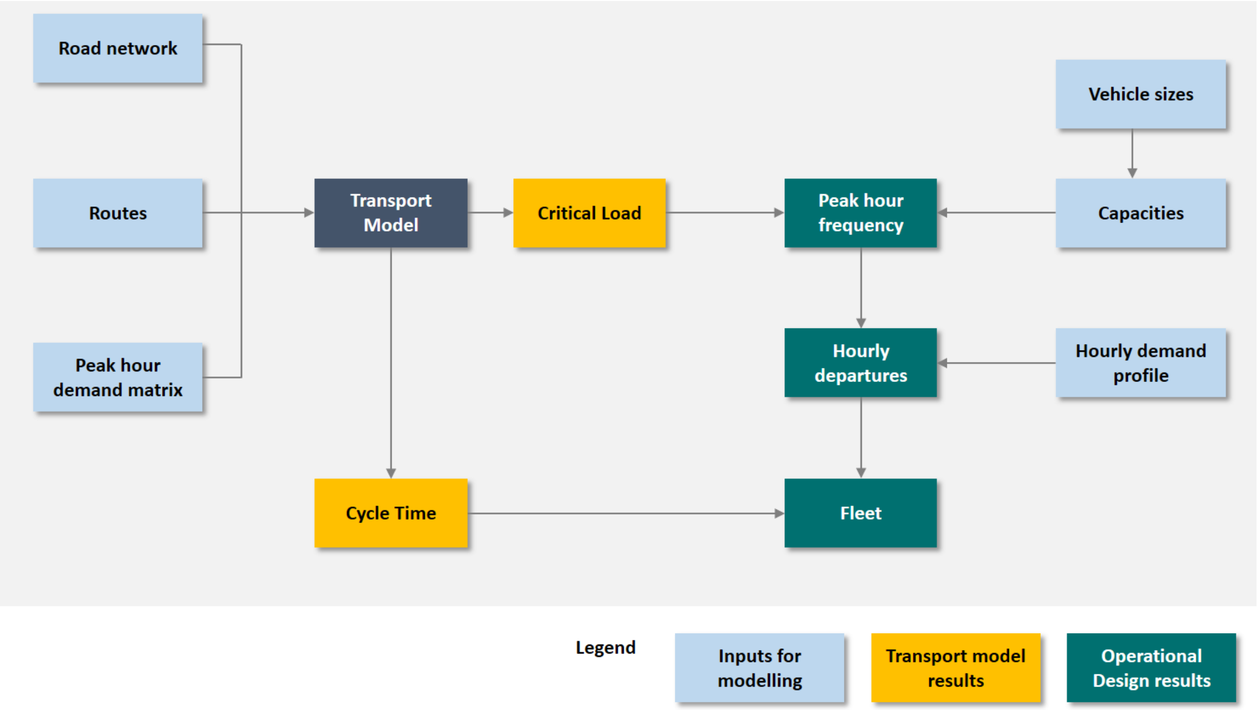

Figure 4.1: Methodology for designing Operational Plan

The minimum frequency for a route on peak hour is function of its critical load, the nominal capacity of the vehicle given to this route, and function of the maximum design occupancy, as presented below:

$$Frequency\ [vehicles/hour] = \frac{Critical\ Load\ [pax/hour]}{Capacity\ [pax/vehicle] * Occupancy\ Factor}$$

For low demand services, it is favorable to assign smaller buses, so that the headway will not be too high, what would cause a negative impact for the user.

The Occupancy Factor was defined as 95%, which is the same as saying that on the peak hour, the buses will be almost completely occupied not during the whole extension of the route, but only on the critical section. Regarding capacities, the following table presents the nominal capacity of each vehicle type analyzed for the BRT system in Karachi.

Table 4.1: Nominal capacities for potential vehicles on Karachi BRT system

Vehicle Size	Nominal vehicle capacity
9 m	50 passengers
12 m	75 passengers
18 m	125 passengers

For hourly frequency, it is necessary to have critical load per hour. As the complete modelling process relies on dimensioning demand and supply only for the peak hour, this information comes from processing the surveys, specifically from the Frequency and Occupancy survey.

Following international manuals for BRT operations, the dimensioning of the fleet considers the following criteria:

$$F_0 = \frac{CT}{H}$$

So that:

- F_0 = Total fleet;
- CT = Cycle time, in minutes;
- H = Headway, in minutes.

4.1.1 Assumptions for fleet sizing

For the development of the Operational Plan it was required not only the methodology and the data from the model, but also some specific assumptions presented in the following table.

Table 4.2: Operational design assumptions

Description	Value
Optimum occupancy per vehicle	95%
Reserve fleet	8%
Layover	10 min
Maximum headway per route	15 min
Dead km	10%

4.2 Modelled scenarios results

According to the assumptions for fleet sizing and the demand data from Transport Model, the operational design per route was defined for all modelled scenarios and is presented in this item.

The following table summarizes the fleet compositions for each route for all the fare structure scenarios evaluated, according to the premises explained in item 3.1.

Table 4.3: Fleet Composition

Route	Fleet Composition	
	FC 1	FC 2
Trunk Service 01	18m	18m
Trunk Service 02	18m	18m
Trunk Service (Super)	18m	18m
Direct Service 01	12m	12m
Direct Service 02	12m	12m
Direct Service 03	9m	12m
Direct Service 04	12m	12m
Direct Service 05	12m	12m

The following table details the BRT Stations for each Red Line service. It should be noted that station RL-20 construction is not expected to be built for the initial operation of Red Line, therefore it was not considered.

Table 4.4 BRT stations for Red Line Services

BRT line	Station ID	RL Trunk Super	RL Trunk 1	RL Trunk 2	RL Direct 1	RL Direct 2	RL Direct 3	RL Direct 4	RL Direct 5	No. Services Stopping at Station
Common Corridor	CC-08		*		*	*				3
	CC-07		*		*	*			*	4
	CC-06		*			*				2
	CC-05		*		*	*			*	4
	CC-04	*	*			*				3
	CC-03		*			*			*	3
	CC-02		*			*				2
	CC-01	*	*	*		*			*	5
Red Line Corridor	RL-00 = YL-01		*	*		*			*	4
	RL-01	*	*		*	*				4
	RL-02		*			*				2
	RL-03		*		*	*				3
	RL-04		*		*	*				3
	RL-05	*	*		*	*				4
	RL-06		*	*				*	*	4
	RL-07		*	*				*		3
	RL-08		*					*		2
	RL-09	*	*					*	*	4
	RL-10		*		*			*		3
	RL-11		*		*			*		3
	RL-12		*	*				*	*	4
	RL-13		*	*				*	*	4
	RL-14		*	*						2
	RL-15	*	*					*	*	4
	RL-16		*	*						2
	RL-17	*	*		*		*	*		5
	RL-18						*			1
	RL-19						*			1
	RL-21			*			*			2
	RL-22			*						1
	RL-23			*						1

4.2.1.1 Scenario with FS 15-55 PKR (2km)

The following table summarizes the main results from the operational plan per route, for all evaluated fleet compositions.

Table 4.5: Operational plan results for FC 1

Route Name	Vehicle Size	Length (km)	Cycle time (min)	Headway (min)	Peak load (pass/h)	Daily boarding (pass/day)	Travelled km (km/day)	Operational Fleet (#bus)
RL Trunk 1	18m	20	125	9	815	82,663	3,888	15
RL Trunk 2	18m	25	128	6	1,097	30,818	6,322	22
RL Trunk Super	18m	18	88	7	1,012	26,342	4,338	14
RL Direct 01	12m	24	167	8	562	61,804	5,290	23
RL Direct 02	12m	23	190	7	615	49,110	5,675	29
RL Direct 03	9m	13	163	5	523	26,922	3,846	33
RL Direct 04	12m	16	106	7	614	49,059	3,831	16
RL Direct 05	12m	29	201	5	730	80,573	8,143	37
							Total + 8% Reserve Fleet	**206**

Table 4.6: Operational plan results for FC 2

Route Name	Vehicle Size	Length (km)	Cycle time (min)	Headway (min)	Peak load (pass/h)	Daily boarding (pass/day)	Travelled km (km/day)	Operational Fleet (#bus)
RL Trunk 1	18m	20	125	9	815	82,663	3,888	15
RL Trunk 2	18m	25	128	6	1,097	30,818	6,322	22
RL Trunk Super	18m	18	88	7	1,012	26,342	4,338	14
RL Direct 01	12m	24	167	8	562	61,804	5,290	23
RL Direct 02	12m	23	190	7	615	49,110	5,675	29
RL Direct 03	12m	13	163	8	523	26,922	2,649	22
RL Direct 04	12m	16	106	7	614	49,059	3,831	16
RL Direct 05	12m	29	201	5	730	80,573	8,143	37
							Total + 8% Reserve Fleet	**194**

The following figure and table show the maximum total frequency of the combined BRT services at peak hour by transit way segment per direction on the Red Line Corridor and the Common Corridor considering only the presented services.

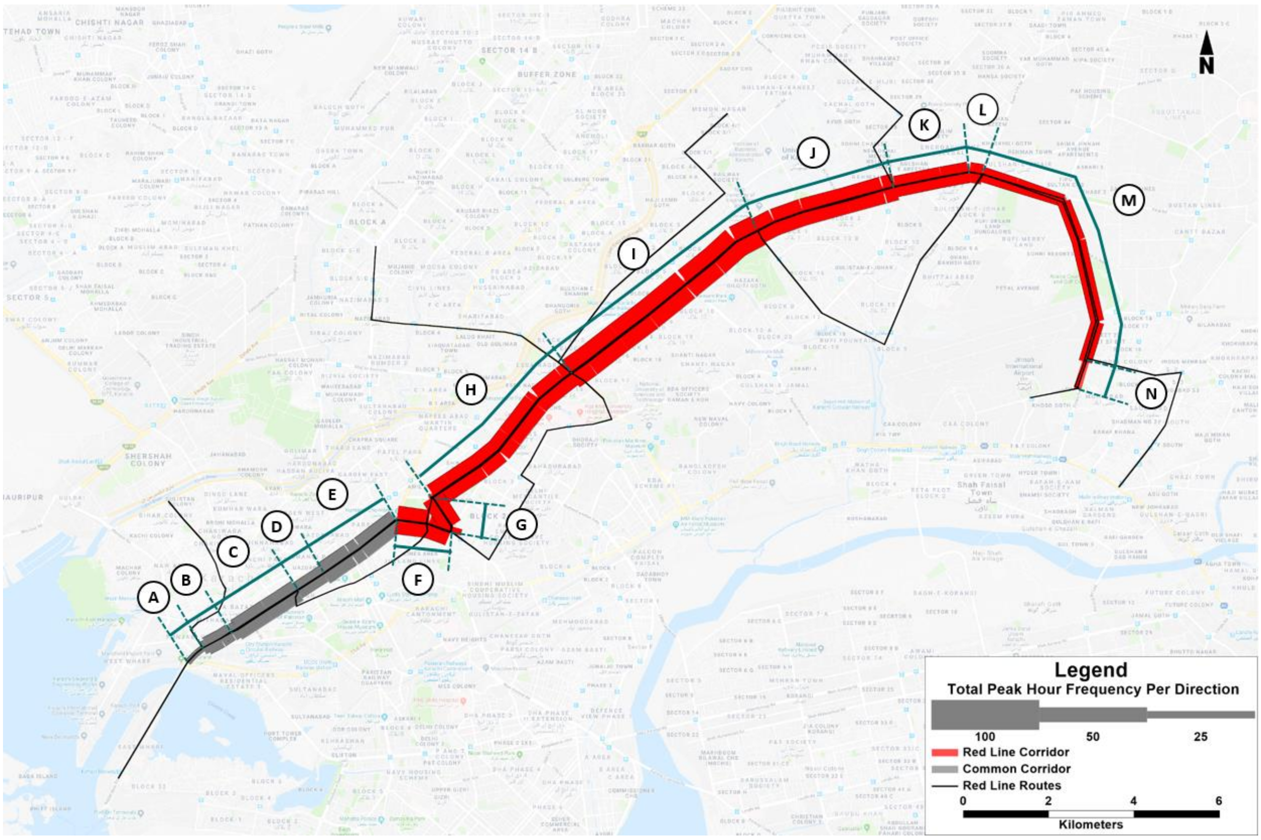

Figure 4.2: Total peak hour frequency per direction on each transit way segment

Table 4.7: Peak hour frequency per direction per transit way segment

Transit way segment	Total peak hour frequency per direction per transit way segment	
	FC 1	FC 2
A	11	11
B	28	28
C	35	35
D	27	27
E	36	36
F	46	46
G	35	35
H	43	43
I	54	54
J	46	46
K	35	35
L	30	26
M	22	18
N	10	10

The following table summarizes the critical frequency of buses per hour at each stations of the Common and Red Line corridor considering the evaluated fleet compositions with only the presented services.

Table 4.8: Critical frequency

BRT line	Station ID	Critical Frequency (bus/h)	
		FC 1	FC 2
Common Corridor	CC-08	48	48
	CC-07	70	70
	CC-06	32	32
	CC-05	70	70
	CC-04	50	50
	CC-03	54	54
	CC-02	32	32
	CC-01	92	92
Red Line Corridor	RL-00 (=YL-01)	74	74
	RL-01	66	66
	RL-02	32	32
	RL-03	48	48
	RL-04	48	48
	RL-05	66	66
	RL-06	74	74
	RL-07	52	52
	RL-08	32	32
	RL-09	72	72
	RL-10	48	48
	RL-11	48	48
	RL-12	74	74
	RL-13	74	74
	RL-14	34	34
	RL-15	72	72
	RL-16	34	34
	RL-17	90	82
	RL-18	24	16
	RL-19	24	16
	RL-21	44	36
	RL-22	20	20
	RL-23	20	20

In order to evaluate the passenger flow on the system, an additional analysis was performed to determine the interchange passenger flow on each BRT station, regarding three flow categories:

- Entry: Total number of users on peak hour that enter the BRT station walking or arriving at the station by some transport mode other than the BRT (such as Coaches, Minibus, Rickshaw, etc);
- Exit: Total number of users on peak hour that exit the BRT station walking or by some transport mode other than the BRT (such as Coaches, Minibus, Rickshaw, etc);

- Internal transfer: Total number of users on peak hour that board a BRT system service coming from another BRT system service, that is, interchanges between one BRT route to another.

The following table and the following figures present the peak hour and daily passenger flow in the BRT stations. For the stations of the Common Corridor, it is also been considered on the calculation the passenger flow of the Green Line services.

Table 4.9: Passenger flow in the BRT stations

BRT Station	Passenger flow on peak hour				Daily passenger flow (pax/day)
	Entry (pax/h)	Exit (pax/h)	Internal transfer (pax/h)	Total (pax/h)	
CC-08	127	823	31	982	12,669
CC-07	113	417	307	837	10,800
CC-06	101	263	0	365	4,704
CC-05	81	112	910	1,104	14,236
CC-04	292	319	392	1,003	12,939
CC-03	151	199	71	420	5,423
CC-02	214	216	0	430	5,549
CC-01	435	470	3,233	4,137	53,370
RL-00 (=YL-01)	401	265	457	1,124	14,495
RL-01	449	264	307	1,019	13,146
RL-02	114	104	1	218	2,818
RL-03	179	216	87	482	6,216
RL-04	163	268	1	431	5,564
RL-05	609	841	484	1,934	24,946
RL-06	249	370	1,313	1,932	24,925
RL-07	345	409	226	980	12,637
RL-08	342	328	1	671	8,654
RL-09	1,299	720	208	2,227	28,732
RL-10	254	161	454	869	11,216
RL-11	213	146	624	983	12,677
RL-12	340	478	297	1,116	14,397
RL-13	315	458	143	915	11,809
RL-14	389	568	0	957	12,343
RL-15	439	538	592	1,569	20,242
RL-16	336	356	87	779	10,052
RL-17	663	642	1,771	3,076	39,686
RL-18	86	86	0	172	2,215
RL-19	168	203	0	371	4,791
RL-21	170	278	407	855	11,028
RL-22	321	262	0	583	7,523
RL-23	130	225	0	355	4,586

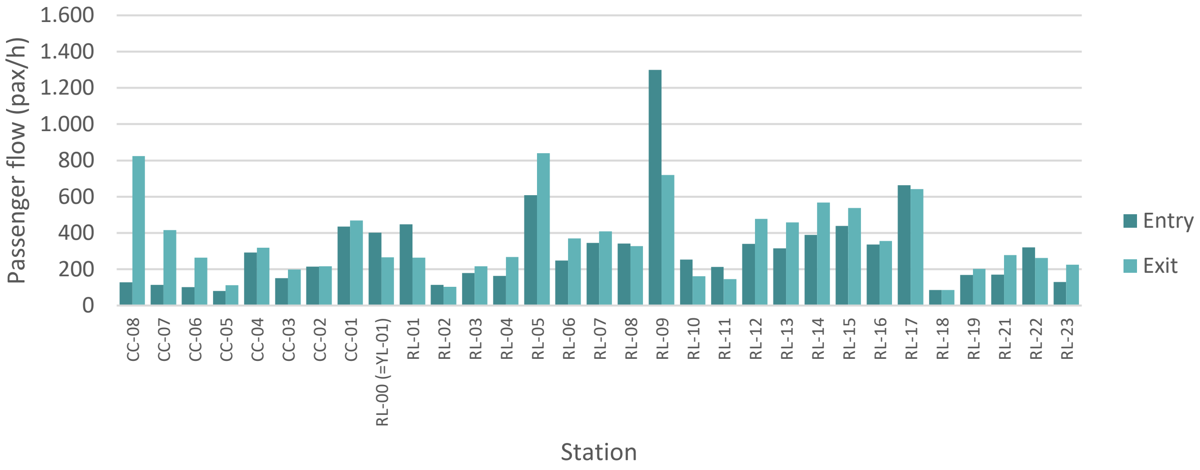

Figure 4.3: Entry and exit of passengers in the BRT stations on peak hour

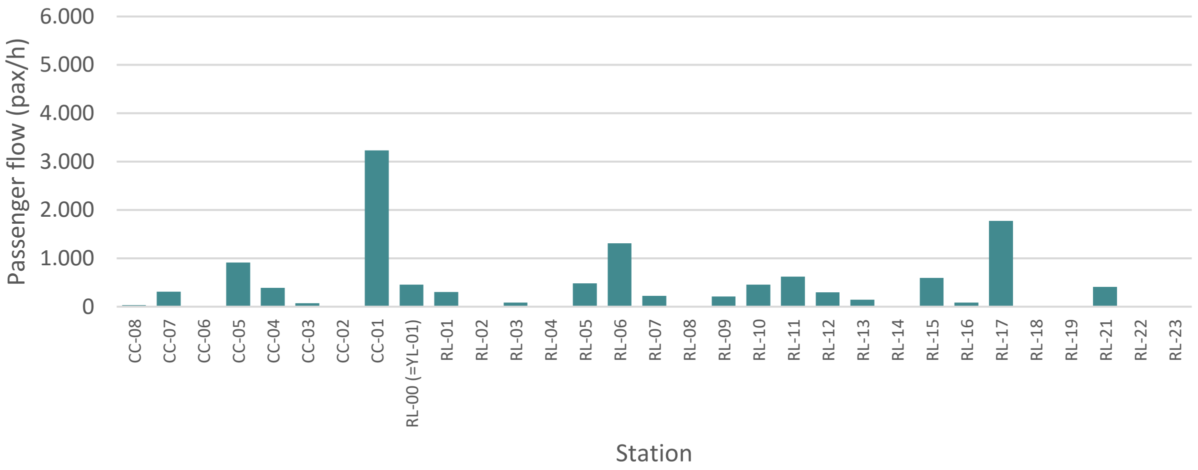

Figure 4.4: Internal transfer of passengers inside the BRT stations on peak hour

4.2.1.2 Scenario with FS 10-40 PKR (5km)

The following table summarizes the main results from the operational plan per route, for all evaluated fleet compositions.

Table 4.10: Operational plan results for FC 1

Route Name	Vehicle Size	Length (km)	Cycle time (min)	Headway (min)	Peak load (pass/h)	Daily boarding (pass/day)	Travelled km (km/day)	Operational Fleet (#bus)
RL Trunk 1	18m	20	125	5	1,294	118,009	5,932	23
RL Trunk 2	18m	25	128	5	1,373	36,597	7,727	26
RL Trunk Super	18m	18	88	5	1,538	37,204	6,294	20
RL Direct 1	12m	24	167	5	865	103,394	7,983	37

Route Name	Vehicle Size	Length (km)	Cycle time (min)	Headway (min)	Peak load (pass/h)	Daily boarding (pass/day)	Travelled km (km/day)	Operational Fleet (#bus)
RL Direct 2	12m	23	190	5	878	72,795	7,769	42
RL Direct 3	9m	13	163	3	829	39,164	5,909	49
RL Direct 4	12m	16	106	5	873	64,319	5,244	23
RL Direct 5	12m	29	201	3	1,393	135,424	15,114	67
							Total + 8% Reserve Fleet	**311**

Table 4.11: Operational plan results for FC 2

Route Name	Vehicle Size	Length (km)	Cycle time (min)	Headway (min)	Peak load (pass/h)	Daily boarding (pass/day)	Travelled km (km/day)	Operational Fleet (#bus)
RL Trunk 1	18m	20	125	5	1,294	118,009	5,932	23
RL Trunk 2	18m	25	128	5	1,373	36,597	7,727	26
RL Trunk Super	18m	18	88	5	1,538	37,204	6,294	20
RL Direct 1	12m	24	167	5	865	103,394	7,983	37
RL Direct 2	12m	23	190	5	878	72,795	7,769	42
RL Direct 3	12m	13	163	5	829	39,164	4,049	33
RL Direct 4	12m	16	106	5	873	64,319	5,244	23
RL Direct 5	12m	29	201	3	1,393	135,424	15,114	67
							Total + 8% Reserve Fleet	**294**

The following figure and table show the maximum total frequency of the combined BRT services at peak hour by transit way segment per direction on the Red Line Corridor and the Common Corridor considering only the presented services.

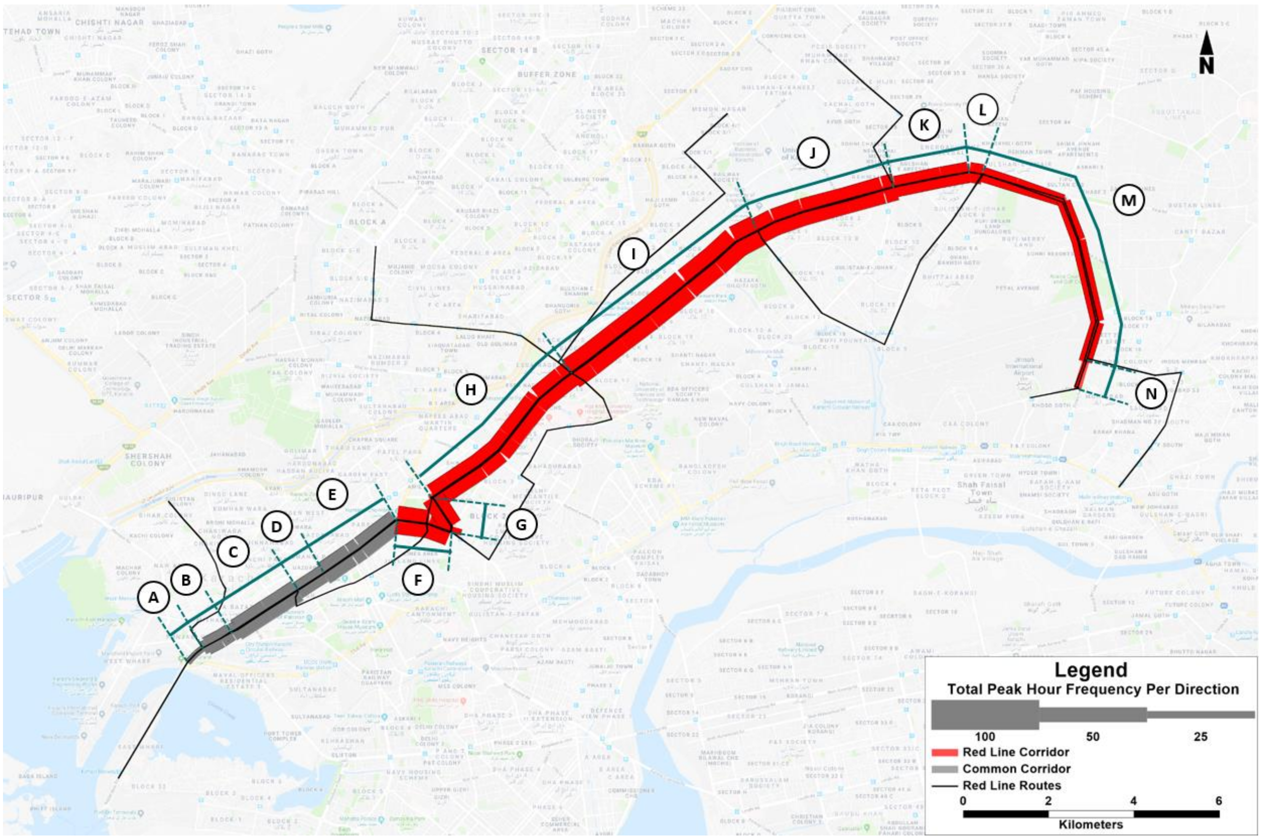

Figure 4.5: Total peak hour frequency per direction on each transit way segment

Table 4.12: Peak hour frequency per direction per transit way segment

Transit way segment	Total peak hour frequency per direction per transit way segment	
	FC 1	FC 2
A	20	20
B	46	46
C	57	57
D	44	44
E	57	57
F	69	69
G	49	49
H	62	62
I	82	82
J	69	69
K	49	49
L	43	37
M	30	24
N	12	12

The following table summarizes the critical frequency of buses per hour at each stations of the Common and Red Line corridor considering the evaluated fleet compositions with only the presented services.

Table 4.13: Critical frequency

BRT line	Station ID	Critical Frequency (bus/h)	
		FC 1	FC 2
Common Corridor	CC-08	74	74
	CC-07	114	114
	CC-06	48	48
	CC-05	114	114
	CC-04	74	74
	CC-03	88	88
	CC-02	48	48
	CC-01	138	138
Red Line Corridor	RL-00 (=YL-01)	112	112
	RL-01	100	100
	RL-02	48	48
	RL-03	74	74
	RL-04	74	74
	RL-05	100	100
	RL-06	112	112
	RL-07	72	72
	RL-08	48	48
	RL-09	114	114
	RL-10	74	74
	RL-11	74	74
	RL-12	112	112
	RL-13	112	112
	RL-14	46	46
	RL-15	114	114
	RL-16	46	46
	RL-17	136	124
	RL-18	36	24
	RL-19	36	24
	RL-21	60	48
	RL-22	24	24
	RL-23	24	24

The following table and the following figures present the peak hour and daily passenger flow in the BRT stations. For the stations of the Common Corridor, it is also been considered on the calculation the passenger flow of the Green Line services.

Table 4.14: Passenger flow in the BRT stations on peak hour

BRT Station	Passenger flow on peak hour				Daily passenger flow (pax/day)
	Entry (pax/h)	Exit (pax/h)	Internal transfer (pax/h)	Total (pax/h)	
CC-08	339	1,535	83	1,958	25,259
CC-07	209	708	746	1,664	21,462
CC-06	159	470	0	629	8,117
CC-05	130	180	1,845	2,156	27,810
CC-04	459	480	700	1,639	21,144
CC-03	349	344	124	816	10,531
CC-02	420	328	0	749	9,658
CC-01	896	664	5,781	7,341	94,697
RL-00 (=YL-01)	632	376	500	1,508	19,447
RL-01	665	375	566	1,606	20,718
RL-02	164	133	1	298	3,848
RL-03	265	296	142	704	9,077
RL-04	219	344	1	564	7,275
RL-05	761	974	677	2,412	31,110
RL-06	302	431	1,723	2,456	31,685
RL-07	396	456	253	1,105	14,249
RL-08	382	354	1	737	9,509
RL-09	1,521	812	240	2,572	33,184
RL-10	305	193	544	1,042	13,438
RL-11	290	207	758	1,255	16,193
RL-12	404	601	352	1,358	17,518
RL-13	367	536	149	1,052	13,570
RL-14	440	643	0	1,084	13,982
RL-15	494	589	715	1,798	23,192
RL-16	362	374	89	825	10,642
RL-17	761	689	2,377	3,827	49,365
RL-18	97	92	0	189	2,438
RL-19	184	222	0	406	5,235
RL-21	190	317	511	1,018	13,128
RL-22	372	302	1	675	8,703
RL-23	147	251	0	398	5,131

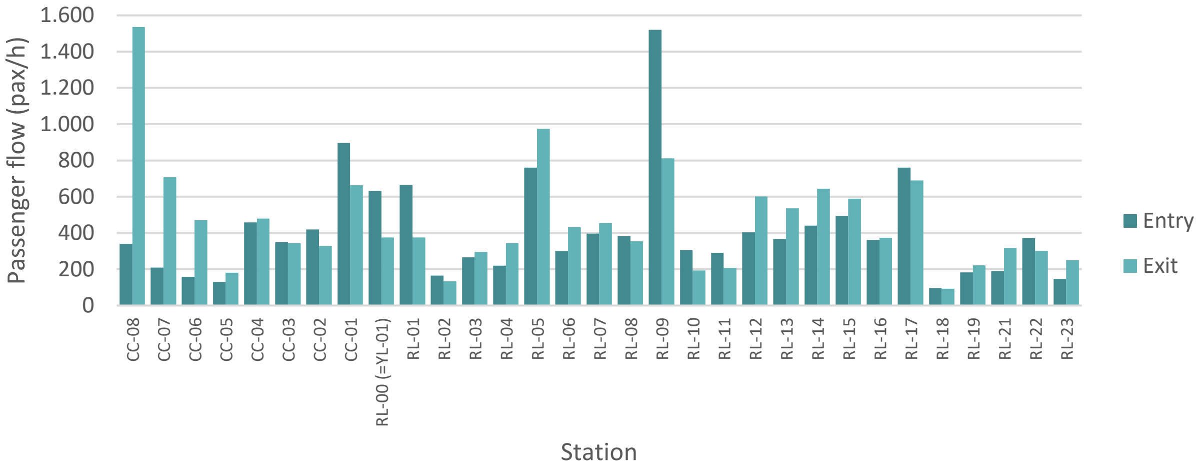

Figure 4.6: Entry and exit of passengers in the BRT stations on peak hour

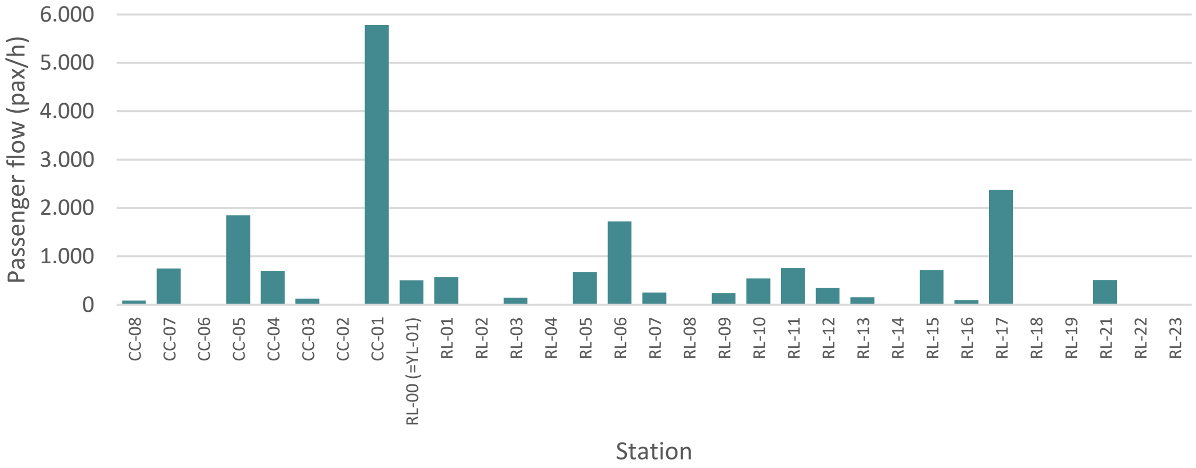

Figure 4.7: Internal transfer of passengers inside the BRT stations on peak hour

4.2.1.3 Scenario with FS 20-50 PKR (5km)

The following table summarizes the main results from the operational plan per route, for all evaluated fleet compositions.

Table 4.15: Operational plan results for FC 1

Route Name	Vehicle Size	Length (km)	Cycle time (min)	Headway (min)	Peak load (pass/h)	Daily boarding (pass/day)	Travelled km (km/day)	Operational Fleet (#bus)
RL Trunk 1	18m	20	125	8	948	87,320	4,409	17
RL Trunk 2	18m	25	128	5	1,243	34,262	6,974	24
RL Trunk Super	18m	18	88	5	1,291	31,605	5,263	17
RL Direct 1	12m	24	167	12	315	64,281	3,414	14
RL Direct 2	12m	23	190	6	701	48,401	6,280	32
RL Direct 3	9m	13	163	4	682	31,076	4,941	41

Route Name	Vehicle Size	Length (km)	Cycle time (min)	Headway (min)	Peak load (pass/h)	Daily boarding (pass/day)	Travelled km (km/day)	Operational Fleet (#bus)
RL Direct 4	12m	16	106	5	735	49,536	4,365	20
RL Direct 5	12m	29	201	5	883	89,152	9,783	44
							Total + 8% Reserve Fleet	**227**

Table 4.16: Operational plan results for FC 2

Route Name	Vehicle Size	Length (km)	Cycle time (min)	Headway (min)	Peak load (pass/h)	Daily boarding (pass/day)	Travelled km (km/day)	Operational Fleet (#bus)
RL Trunk 1	18m	20	125	8	948	87,320	4,409	17
RL Trunk 2	18m	25	128	5	1,243	34,262	6,974	24
RL Trunk Super	18m	18	88	5	1,291	31,605	5,263	17
RL Direct 1	12m	24	167	12	315	64,281	3,414	14
RL Direct 2	12m	23	190	6	701	48,401	6,280	32
RL Direct 3	12m	13	163	6	682	31,076	3,438	28
RL Direct 4	12m	16	106	5	735	49,536	4,365	20
RL Direct 5	12m	29	201	5	883	89,152	9,783	44
							Total + 8% Reserve Fleet	**213**

The following figure and table show the maximum total frequency of the combined BRT services at peak hour by transit way segment per direction on the Red Line Corridor and the Common Corridor considering only the presented services.

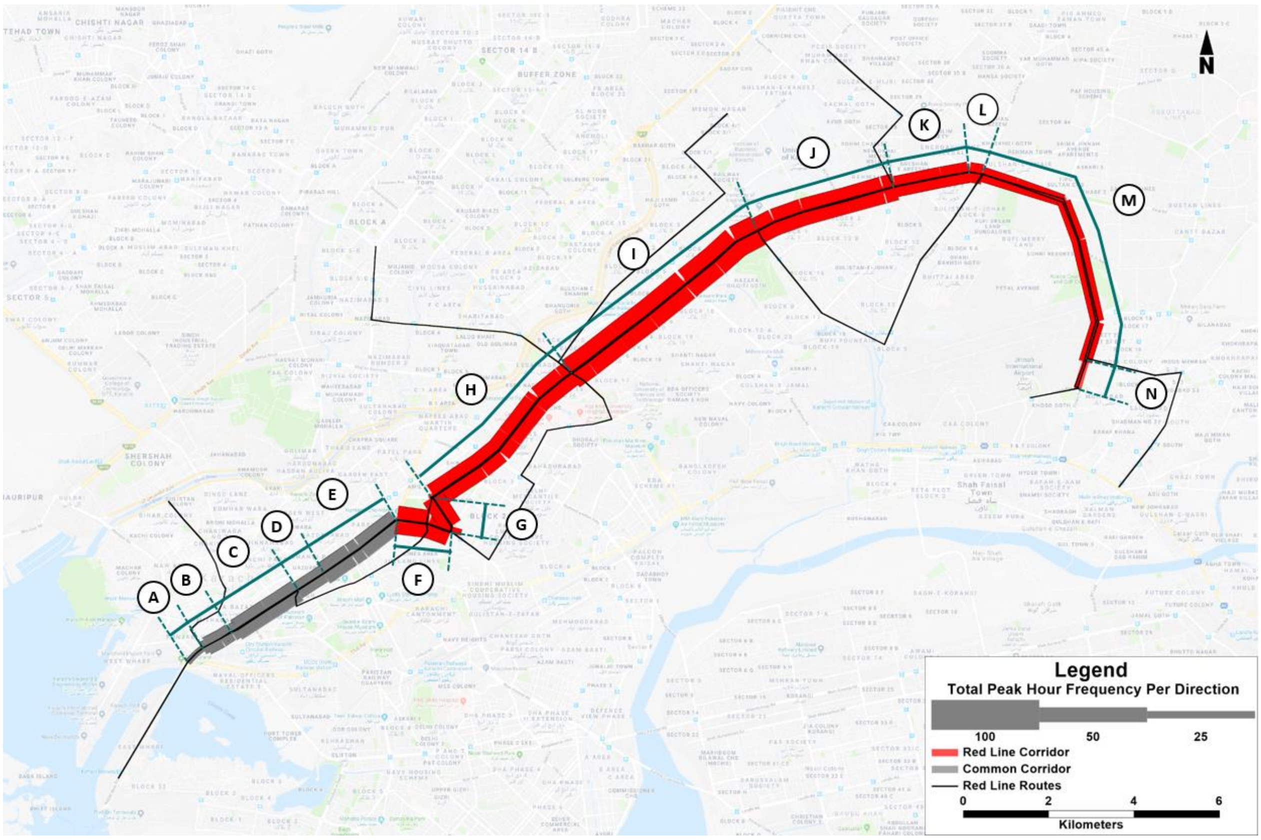

Figure 4.8: Total peak hour frequency per direction on each transit way segment

Table 4.17: Peak hour frequency per direction per transit way segment

Transit way segment	Total peak hour frequency per direction per transit way segment	
	FC 1	**FC 2**
A	13	13
B	28	28
C	36	36
D	31	31
E	42	42
F	53	40
G	40	53
H	45	45
I	59	59
J	54	54
K	41	41
L	31	26
M	26	21
N	11	11

The following table summarizes the critical frequency of buses per hour at each stations of the Common and Red Line corridor considering the evaluated fleet compositions with only the presented services.

Table 4.18: Critical frequency

BRT line	Station ID	Critical Frequency (bus/h)	
		FC 1	FC 2
Common Corridor	CC-08	46	46
	CC-07	72	72
	CC-06	36	36
	CC-05	72	72
	CC-04	58	58
	CC-03	62	62
	CC-02	36	36
	CC-01	106	106
Red Line Corridor	RL-00 (=YL-01)	84	84
	RL-01	68	68
	RL-02	36	36
	RL-03	46	46
	RL-04	46	46
	RL-05	68	68
	RL-06	86	86
	RL-07	60	60
	RL-08	38	38
	RL-09	86	86
	RL-10	48	48
	RL-11	48	48
	RL-12	86	86
	RL-13	86	86
	RL-14	38	38
	RL-15	86	86
	RL-16	38	38
	RL-17	100	90
	RL-18	30	20
	RL-19	30	20
	RL-21	52	42
	RL-22	22	22
	RL-23	22	22

The following table and the following figures present the peak hour and daily passenger flow in the BRT stations. For the stations of the Common Corridor, it is also been considered on the calculation the passenger flow of the Green Line services.

Table 4.19: Passenger flow in the BRT stations on peak hour

BRT Station	Passenger flow on peak hour				Daily passenger flow (pax/day)
	Entry (pax/h)	Exit (pax/h)	Internal transfer (pax/h)	Total (pax/h)	
CC-08	137	925	51	1,113	14,355
CC-07	119	431	246	796	10,274
CC-06	102	299	0	401	5,167
CC-05	73	113	1,180	1,366	17,627
CC-04	247	307	561	1,115	14,389
CC-03	151	203	71	425	5,479
CC-02	214	200	1	415	5,357
CC-01	381	354	4,425	5,160	66,570
RL-00 (=YL-01)	404	247	511	1,162	14,993
RL-01	460	260	476	1,196	15,429
RL-02	116	97	0	213	2,744
RL-03	171	203	78	452	5,836
RL-04	152	269	31	452	5,825
RL-05	547	767	565	1,879	24,243
RL-06	231	361	1,262	1,854	23,916
RL-07	321	396	355	1,072	13,825
RL-08	327	321	1	649	8,367
RL-09	1,248	694	217	2,159	27,853
RL-10	243	154	458	855	11,033
RL-11	200	133	624	957	12,340
RL-12	335	475	294	1,105	14,250
RL-13	317	463	169	949	12,247
RL-14	393	576	4	973	12,547
RL-15	442	539	634	1,615	20,836
RL-16	324	346	86	756	9,750
RL-17	658	637	2,100	3,395	43,791
RL-18	86	86	0	172	2,219
RL-19	171	205	0	376	4,850
RL-21	176	282	466	924	11,924
RL-22	341	283	0	624	8,048
RL-23	140	240	0	379	4,892

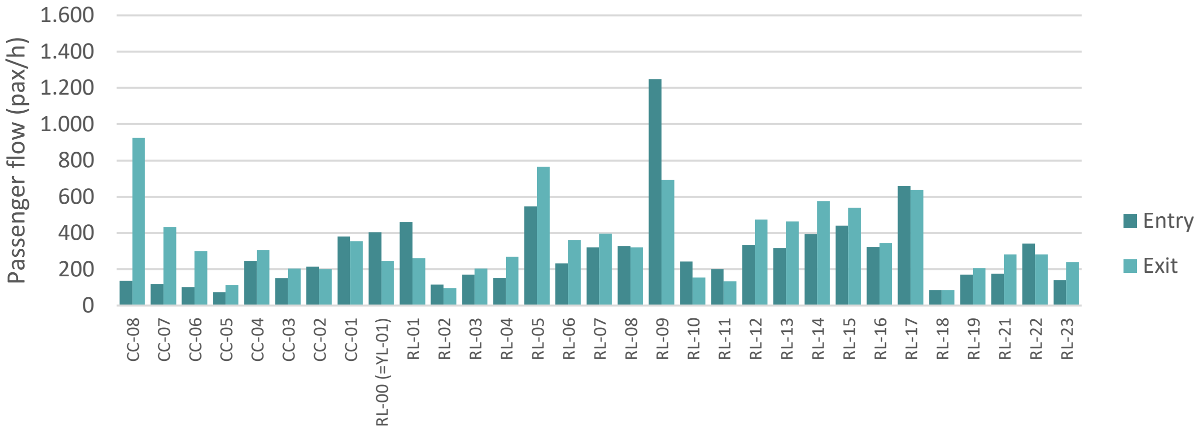

Figure 4.9: Entry and exit of passengers in the BRT stations on peak hour

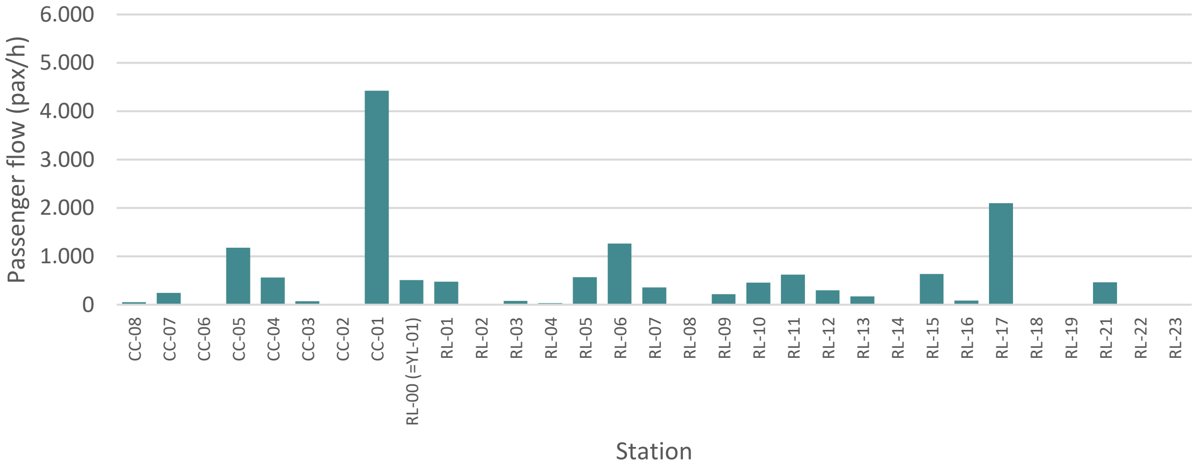

Figure 4.10: Internal transfer of passengers inside the BRT stations on peak hour

5. Maintenance Plan for Fleet

The maintenance plan for the BRT fleet aims to ensure maximum vehicle availability, consistent with international standards, during the peak periods, moment in which the system needs a higher number of buses operating the services. If a big number of vehicles are unavailable, the operation will occur below the minimum expected level of service. The services will operate with lower frequencies and the buses will need to carry more passengers than the capacity.

The maintenance of the BRT fleet includes mechanical maintenance, cleaning, conservation and monitoring procedures under the supervision of the bus supplier, as detailed in the following items.

5.1 Maintenance Responsibility

In the first two years of the BRT operations, the supplier of the buses will provide vehicle maintenance supervision. This will occur because of the inexperience of the Operator Company with the new vehicles. During this period, the bus supplier will be responsible for overseeing all scheduled maintenance activities of the vehicles. Thus, the bus supplier must implement a Maintenance Plan according to the best recommendations for the new buses, such as the maintenance checklist and the schedule of preventive maintenances. Vehicle and component manufacturer's manuals are an important part of the vehicle maintenance plan as they define specific maintenance interval and provide the required critical information.

The BRT Operator Company will be providing the maintenance staff, who will be advised by the Supplier's maintenance supervisor in carrying out the routine maintenance activities. The bus supplier shall also provide all replacement parts for all maintenance items caused through normal wear and tear as well as scheduled replacements. Conversely, the BRT Operator Company will be responsible for all materials and associated costs for repair actions caused by road collisions or other unscheduled incidents.

5.2 Maintenance Training

The bus supplier shall deliver a maintenance-training program that will properly prepare the BRT Operator Company to independently maintain its vehicle fleet after the end of the two-year period of maintenance supervision.

The training program will take place at intervals over at least 320 hours of actual training sessions. These sessions will include both classroom instructions as well as hands-on repair work in the depot maintenance area. Approximately 40 persons from the BRT Operator Company will be trained for the maintenance of each vehicle type.

5.3 Preventive Mechanical Maintenance

The schedule of preventive maintenance for each vehicle is a simple way to avoid operational problems and additional repair costs. During the preventive maintenance, the responsible professional can check for signs of wear and tear that can lead to future breakdowns or accidents and ensure that vehicles run safely and reliably. The level and frequency of preventive maintenance shall be determined considering bus supplier recommendations and operating conditions.

The creation of a checklist for the inspection of the major systems and items of the vehicles is the best practice to avoid skipping important maintenance tasks. The maintenance checklist must be unique for each vehicle type and shall include the checking of the following items:

- The major bus systems, such as fuel, auxiliary, braking, exhaust and others;
- The cabin controls;
- Tires and wheels;
- Level of all fluids;
- External and interior lights;

- Frame, undercarriage and drive shaft;
- All safety items, such as horn and seat belt.

5.4 Special Maintenance Procedures

In addition, it is recommended the establishment of special maintenance procedures to address the most common fleet problems that affect reliability such as electrical components failures and engine overheating. The special maintenance procedures aim to solve the most common fleet problems on a quickly way and avoid a great number of vehicles waiting for the maintenance services.

As special procedures, can be also included the most common minor repairs required for the buses of the system. The identification of the problems and repairs that require special procedures can be done based on monitoring information, as detailed forward.

5.5 Cleaning and Conservation

In the best-performing BRT systems, the internal cleaning of the vehicle occurs at the end of each journey and the external washing occurs at the end of the vehicle daily shift.

The internal cleaning includes the vacuuming of the vehicle and the removal of any materials, debris and dirt that may compromise the comfort of system users.

The external washing includes the removal of all external dirt of the vehicle. The vehicle wash aims to maintain the visibility through the windows and mirrors and the good appearance of the system with clean, well-maintained buses. The vehicle wash is directly correlated with the visual identity of the system and visibility of the brand in all vehicles.

5.6 Monitoring

Each vehicle must have a written record documenting all the maintenance history, such as preventive maintenances and repairs performed, within a minimum of the following information:

1. Identification of the vehicle, such as serial number, year, brand, model type and license plate number;
2. Date of each activity;
3. Mileage history.

The registration of all maintenance procedures can be used as a data set for cost indicators (cost per kilometre and cost per bus) and quality indicators (number of breakdowns). Other measure of the success of the maintenance program can be the number of unplanned/emergency repairs that have to be undertaken. The preventive mechanical maintenance shall keep these levels to the minimum. Without data, it is impossible to conclude whether the depots are spending more time and resources.

The supervisors of the process shall institute a series of random and periodic checks on repair/maintenance quality. Regular and surprise checks can reveal problems on the maintenance process, and the mechanics with higher than average repetition of problems can be trained to avoid more future problems.

The involvement of the drivers in the maintenance process can be useful and helps on the identification of any problem with the vehicle or with the infrastructure. The establishment of a communication link between drivers and the system management is an important aspect of the preventive maintenance. The drivers can identify any defects and report then to the maintenance supervisors through pre- and post-trip forms.

6. Recommendations for Operational Plan Implementation

As the new Karachi BRT system is a completely new transport service for Karachi, it is expected that it will take some time before the system is completely assimilated by the population as users are not are used to it.

6.1 Transition Time

This transition time can be divided into two phases of operation of the BRT system: the pilot phase and the full operation phase.

The **pilot phase** relates to user's behavior and can be understood as a period of adaptation of the population to something different from the usual. The more the new system differs from the current situation, the longer the pilot phase might take. The pilot phase starts with the start up of the BRT system and is expected to last from 1 to 2 years.

After this period, with the population adapted to the new transport system, it is expected that the demand of the BRT will be more stable, reflecting the fact that the system reached the **full operation phase**.

To guarantee the system success, it is desirable to attract as many people as possible to it, while still maintaining a high level of service. With this in mind, some actions can be taken aiming to shorten the pilot phase period, such as an implementation strategy considering the existing services fare structure and designing the BRT fare structure in a similar manner, thus minimizing any reluctance of the public transport users to adhere to the new system.

6.2 Implementation Strategy

A possible strategy for the BRT system implementation in Karachi can be:

1. First adopt an affordable fare structure for the start-up of the system, aiming to improve the population approval of the system during the pilot phase, and
2. At the same time, implement a package of actions aiming to increase the demand and the revenue of the system.
3. Once in full operation, the system would be in a better position to adopt a higher fare structure, which would reduce the required subsidy of the system

This implementation strategy is illustrated in the following figure.

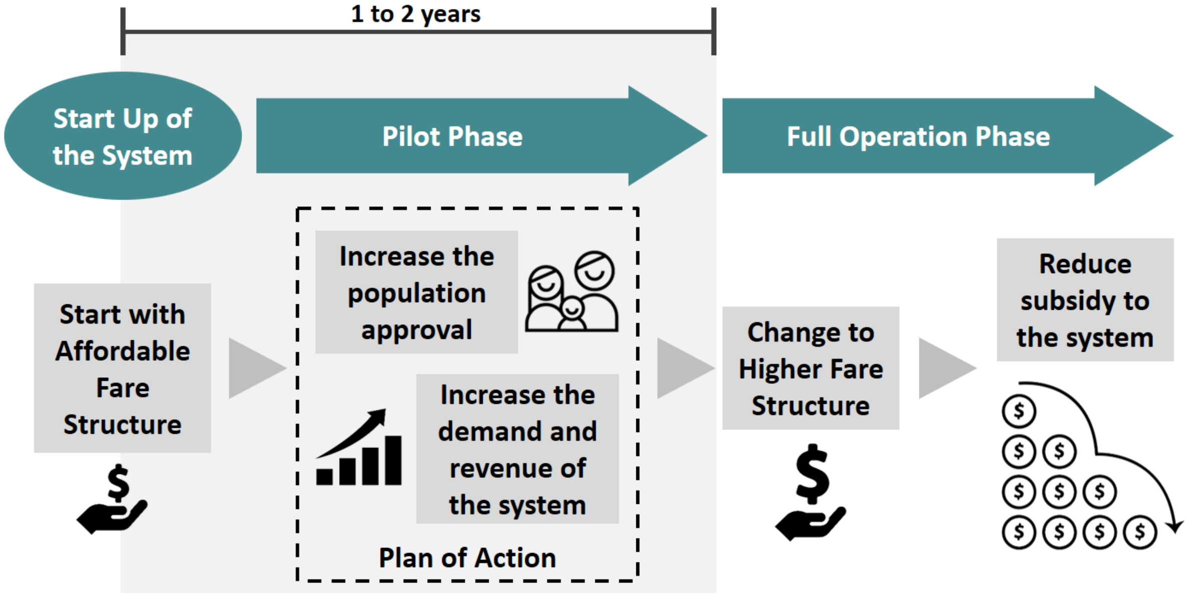
1 to 2 years
Start Up of the System
Pilot Phase
Full Operation Phase
Start with Affordable Fare Structure
Increase the population approval
Increase the demand and revenue of the system
Plan of Action
Change to Higher Fare Structure
Reduce subsidy to the system

Figure 6.1: Implementation strategy of the BRT system

6.3 Start with Affordable Fare Structure

The following figure shows the three Fare Structures considered for Karachi BRT Corridor on this study. It is noted that the **FS-10 (5km)** is the one that is closest to the current public transportation fare levels and it is, therefore, the **most recommended Fare Structure** to be adopted on the Start Up of the Karachi BRT system.

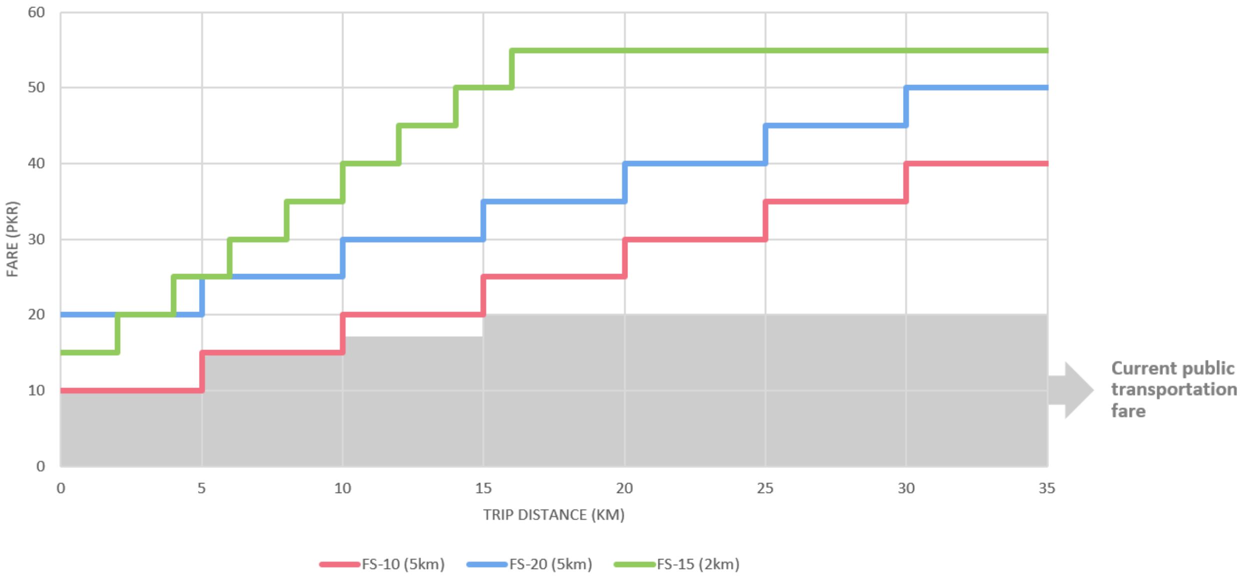

Figure 6.2: Fare Structures scenarios for modelling purposes

The implementation of a new urban system is a drastic change in the routine of the city's residents and therefore obstacles to success should be reduced to the maximum. The implementation of the system with a Fare Structure as close as possible of the current fare levels will increase the chances of the new system (and the government) to face less resistance from the population. That will facilitate the consolidation of Karachi BRT as a successful system.

The recommended Fare Structure (FS-10 – 5km) is more similar to the current fare structure considering the short trips. This feature have great importance in encouraging the use of the system, since shorter trips are generally less influenced by the painful transfers - required in the current system - or by the discomfort of travelling on substandard vehicles.

For longer journeys, the proposed Fare Structure is higher than the current one. This feature improves the financial result of the system, that is, it costs less to the government to maintain a system working with good quality. However, it is expected that for longer trips the reducing of the travel time, the reducing of the number of transfers and the significantly increasing of comfort inside the buses and stations will encourage the user to pay a higher fare, but not so high, without much resistance to the increase of the daily costs.

6.4 Complementary Plan of Action

Additionally, a package of actions (detailed below) could be implemented during the pilot phase in order to increase the demand and the revenue of the Karachi BRT system.

The following Figure 6.3 presents a scheme that qualitatively illustrates the demand behavior over time in the BRT considering (1) the different phases of operation and (2) the effect that a strategical package of actions could have on the demand. All values presented so far in this report consider the full system operation phase, without considering the effect of a package of actions that would promote greater demand levels on the system and possibly better financial results.

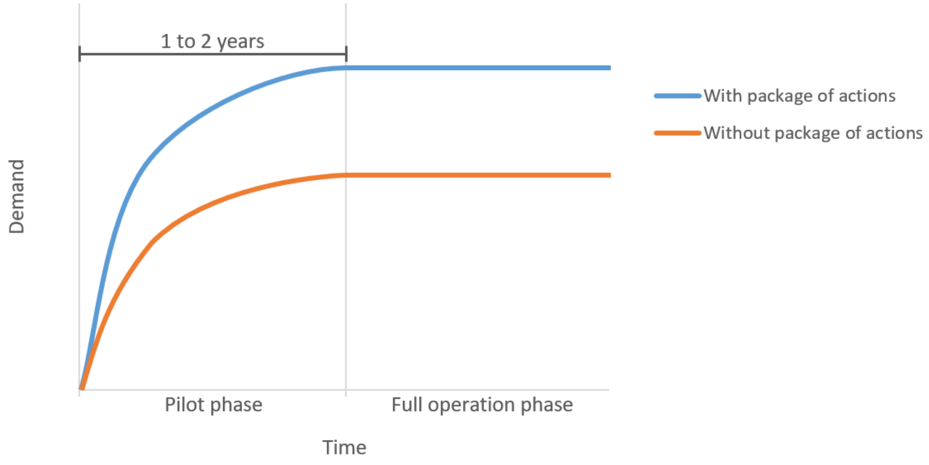

Figure 6.3: Demand of the BRT system for the pilot and full operation phases with and without the package of actions

The package of actions that seeks to increase the demand and the revenue of the system is composed of two main groups of actions:

1. Discourage the use of private transportation;
2. Increase the non-fare revenue.

To discourage the use of private transportation, efforts should be focused on motorcycle users, which are one of the main competitors of the BRT system. Some actions that can be taken are:

1. Charging high fares for parking on the streets
2. Reducing the number of parking spots on the streets
3. Increase taxes on the private parking areas
4. Limit the number of parking spaces in new construction near the BRT corridor
5. Increasing the taxes on fuel and
6. Incentivizing government employees to use the BRT system.

Finally, as a way of increasing non-fare revenue, the leasing of commercial spaces at stations could be expanded according to the increase of demand in strategical stations. Additionally, land value capture of the properties in the surroundings of the BRT infrastructure could be explored, as explained in more details in Appendix C of Interim Report 1.

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUT 1.5 AND OUTPUT 4.5 - BUSINESS MODEL FOR BRT OPERATIONS

July 2018

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

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1. Introduction

1.1 Purpose of the Business Model Report

This report aims to identify the various business services and entities involved in BRT operations- Red and Yellow Line in Karachi. Further, the report aims to determine which business services can be integrated and which should remain independent. The report proposes a deal structure that ensures Value for Money, keeping in mind the economic and institutional context of Karachi and the most effective allocation of risks. The report also provides a high-level preliminary remuneration structure.

1.2 Structure of the Business Model Report

The report consists of the following parts:

- Introduction
  This section describes the purpose of the report and our approach towards framing an appropriate deal structure that will work for a BRT system- Red and Yellow Line in Karachi. The section also introduces the various business services in a BRT system.

- Decisions to be made
  In framing the business model, it is essential to understand the various models that can be implemented due to the large number of business services involved. Options are posed for which business services are to be integrated, which services should remain independent and how roles and risks should be appropriately allocated. The final deal structure is framed building up from business service to business service, finally realizing into a final deal structure that consolidates all business services and clearly allocates these services to specific entities.

  This section approaches each decision via two options, framing the deal structure for both options, providing benefits and drawbacks of each option and finally recommending the optimal option for the deal structure. For purposes of better understanding a distinction has been made between the granting authority, the business services and the business entities via a color code in the deal structure diagrams.

  🟦 Granting Authority
  🟩 Business Unit
  🟥 Business Entity

- Conclusions
  This section proposes the final deal structure and outlines the final business entities involved with their various roles. It also proposes a preliminary high-level remuneration structure that is applicable to the BRT business model.

1.3 Approach to Deal Structure

Our approach towards a successful deal structure has the following key considerations:

- Ensuring optimum utilization of budget resources by achieving Value for Money;
- Allocating risks to the entity in best position to manage them and ultimately control the costs;
- Tailoring the deal to the institutional context of Karachi;
- Making the deal attractive for local and international operators and investors to bid; and
- Ensuring it leaves open the possibility of expanding the system further

1.4 BRT Business Services

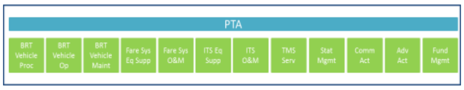
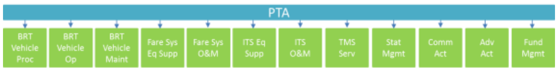
The following table provides a description of each business service involved in the BRT operations:

Business Service	Description
Fleet Supply	This refers to procuring a new fleet that meet capacity requirements, safety requirements and environmental standards. The BRT system is Karachi requires different BRT vehicles of 12-meter length and 18-meter length.
BRT Vehicle Operations & Maintenance	This refers to procurement of bus operations, which includes recruiting, and training of bus drivers, dispatching of buses and staffing for bus operations. The Vehicle operator is also responsible for the regular cleaning, re-servicing and maintenance processes to maintain quality, comfort and safety requirements of the BRT vehicles.
Fare System Equipment Supply	This includes procurement of automatic gates, validators, ticketing machines, station computers, central servers and computers as well as the software.
Fare System Operation & Maintenance	This includes operation and maintenance of the above-mentioned hardware and software components of the Fare System.
Intelligent Transport System (ITS) Equipment Supply	This includes the procurement of onboard computers, station computers, station speakers and audio systems, cell-based communicators, GPS systems, CCTV cameras, alarms, etc.
Intelligent Transport System Operation & Maintenance	This includes operation and maintenance of the above-mentioned hardware and software components of the ITS, the operation and management of the control center.
Traffic Management Systems (TMS) Equipment Supply	This includes procurement of traffic signal equipment including controller and vehicle detection equipment and software for signal planning.
Traffic Management System Operation & Maintenance	This includes the operation and maintenance of the above mentioned hardware and software components of the TMS
Call Center Services	This includes procurement of call center equipment and operation & management of the call center.

Business Service	Description
Station Management Services	Station management services include provision of network connectivity, water and power. It also includes the responsibility for cleaning, maintenance and security and landscaping.
Commercial Activities	This includes the management of kiosks and other commercial space in the stations.
Advertising	Advertising in BRTs can be done on the smartcards, the vehicles and the BRT stations.
Fund Management	This includes the management of the fare accounts and the distribution of funds to all parties involved according to contractually agreed formulae.

2. Decisions to be made

2.1 Public Operation vs. Subcontracted Operation

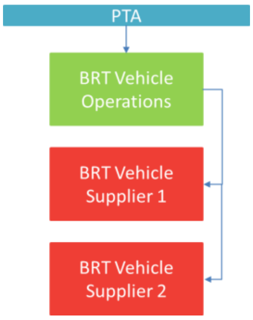
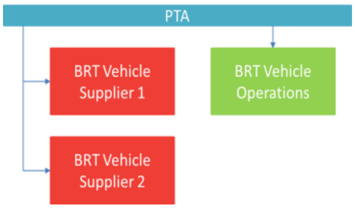
Options	Public Operation	Subcontracted Operation
Structure	 PTA BRT Vehicle Proc BRT Vehicle Op BRT Vehicle Maint Fare Sys Eq Supp Fare Sys O&M ITS Eq Supp ITS O&M TMS Serv Stat Mgmt Comm Act Adv Act Fund Mgmt	 PTA BRT Vehicle Proc BRT Vehicle Op BRT Vehicle Maint Fare Sys Eq Supp Fare Sys O&M ITS Eq Supp ITS O&M TMS Serv Stat Mgmt Comm Act Adv Act Fund Mgmt
Explanation	Public Transport Authority (PTA) takes full responsibility for carrying out all BRT service components.	PTA subcontracts services to various private entities to carry out the BRT services. In this format, it retains the ultimate responsibility for all BRT business operations. PTA holds the role of the contract manager, responsible for performance monitoring and overall project delivery.
Benefits	• PTA has direct control of all BRT service components	• Most successful BRT projects include private sector participation • Private sector is better equipped to handle day to day operations and maintenance of a BRT system • Subcontracted operation allows for competition, leading to cost-effective, innovative and better quality solutions
Drawbacks	• PTA cannot manufacture or supply BRT vehicles and equipment for Fare System and ITS services. Therefore, these services need to be outsourced.	• Long term contracts require specific contract management skills from the public authority

Options	Public Operation	Subcontracted Operation
	- Government has a poor track record in directly providing public transport services in Pakistan - Creates conflict of interest between quality control and system accountability	

Recommendation:

It is recommended to carry out the BRT via subcontracting business services to private entities.

2.2 Fleet Procurement and BRT Vehicle Operations: Integrated vs. Separate Contract

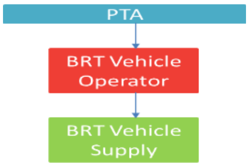
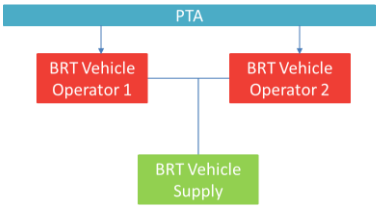
Options	Integrated contract	Separate contract
Structure	 PTA BRT Vehicle Operations BRT Vehicle Supplier 1 BRT Vehicle Supplier 2	 PTA BRT Vehicle Supplier 1 BRT Vehicle Operations BRT Vehicle Supplier 2
Explanation	The BRT Vehicle Operator(s) contracted by PTA carries out responsibility for procuring two BRT Vehicle Suppliers.	PTA carries out a separate tender for the BRT vehicles.
Benefits	- Optimization of capital costs and operational costs - Large bus operator(s) may be in a better position than PTA to negotiate with suppliers due to experience and more frequent and larger orders - Transfers risk of default of BRT Vehicle Suppliers to the BRT Vehicle Operator(s) - ADB loan can still be used to (re)finance milestone payments to the bus suppliers upon delivery - ADB loans can be used to (re)finance capital investment	- Tender is carried out under ADB guidelines and supervision, thereby limiting risks of malpractice - Leads to the procurement of higher quality vehicles, as the existing operators will tend to focus only on short-term costs and not the longer-term implications
Drawbacks	- PTA cannot individually select both BRT Vehicle Operator(s) and BRT Vehicle Suppliers - Significantly delays the procurement of the vehicles, as BRT Vehicle	- The BRT Vehicle Operator(s) will have less incentive to operate the vehicles with care, leading to added costs in maintenance - Interparty issues since the quality of the fleet is outside the responsibility of the BRT Vehicle

Options	Integrated contract	Separate contract
	Operators must be sequentially selected first, followed by a confirmation of the BRT vehicle order	Operator(s) and giving the opportunity to BRT Vehicle Operator(s) to blame the supplier for its own shortcomings • Timing risk as normally BRT Vehicle Operators would expect compensations to be payable to cover costs incurred for training and availability of staff if buses are not delivered on time

Recommendation:

It is recommended to follow an integrated contract for operations and fleet procurement as this allows for a better allocation of risks and a stronger sense of ownership of the BRT vehicles by the BRT Operators.

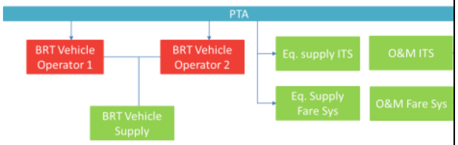
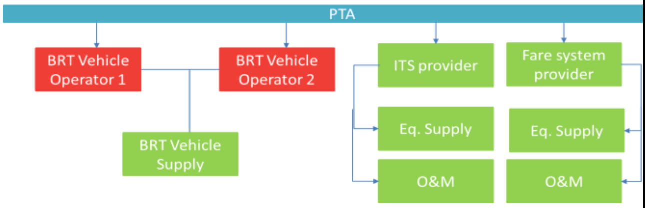
2.3 BRT Vehicle Operations: One vs. Two Operators

Options	One operator	Two operators
Structure		 PTA BRT Vehicle Operator 1 BRT Vehicle Operator 2 BRT Vehicle Supply
Explanation	PTA launches a tender to select one BRT Vehicle Operator for the BRT system.	PTA launches a tender to select two BRT Vehicle Operators for the BRT system
Benefits	• Simpler tender process • Easier contract management and less interface issues • Ease of scheduling the BRT vehicles • Simplifies operational phase	• Allows for comparative performance evaluations, thereby ensuring better quality from both operators • Ensures more existing operators can participate in the system, and thus reduces potential of opposition to the BRT system • Reduces the operational risk of depending on a single monopoly operator
Drawbacks	• Less opportunity to accommodate existing local operators • Many existing associations will not be able to work together due to past rivalries • No fallback option in case one operator defaults on its contractual obligations • Increased risk of renegotiation attempts due to monopoly position of the BRT Vehicle Operator	• More complicated fleet allocation and bid evaluation process • Lower level of competition and increased risk of bidder collusion • Need for two BRT depots • Duplication of management and administrative costs • Risk of conflicts between BRT Vehicle Operators

Recommendation:

It is recommended to launch a tender for selecting two BRT Vehicle Operators. In order to provide an incentive for competition and reduce risks of bidder collusion at tender stage, it is advised to implement a ranking mechanism whereby the higher-ranking bidder will be allocated a larger proportion of the fleet.

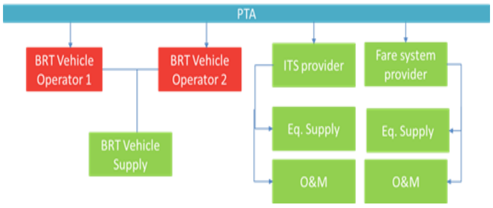
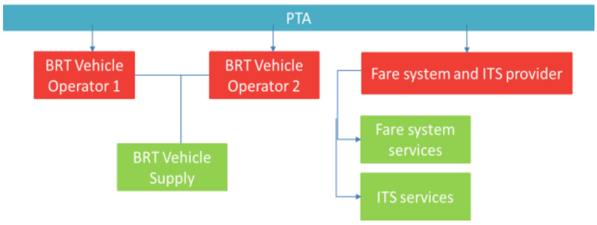
2.4 Equipment Supply and Operation & Maintenance for Fare System and ITS: Separate vs. Integrated

Options	Separate	Integrated
Structure	 PTA BRT Vehicle Operator 1 BRT Vehicle Operator 2 Eq. supply ITS O&M ITS Eq. Supply Fare Sys O&M Fare Sys BRT Vehicle Supply	 PTA BRT Vehicle Operator 1 BRT Vehicle Operator 2 ITS provider Fare system provider BRT Vehicle Supply Eq. Supply Eq. Supply O&M O&M
Explanation	PTA launches separate tenders for Fare System equipment supply, fare system operation & maintenance, ITS equipment supply and ITS operation & maintenance.	PTA launches tenders for Fare System service provider and ITS service provider. Each service provider will hold responsibility for equipment supply and operation & maintenance.
Benefits		• Fare system and ITS equipment suppliers are in the best position to provide operation and maintenance services • Comparatively less interface risks and easier contract management
Drawbacks	• It is very difficult to provide operations and maintenance for equipment and especially software provided by a third entity resulting in limited bidders for maintenance • Additional tender and contract management burden for PTA	• Specifically, in the context of Karachi, there is the risk of equipment suppliers unwilling to provide operation and maintenance services in long-term contracts

Recommendation:

It is recommended to integrate the equipment supply and operation & maintenance components for both Fare System and Intelligent Transport Systems. Milestone payments to the service providers upon full service acceptance can be envisaged to reduce the long-term capital commitments and increase market interest.

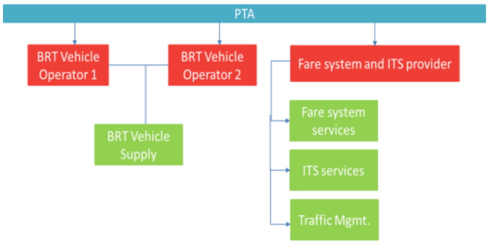
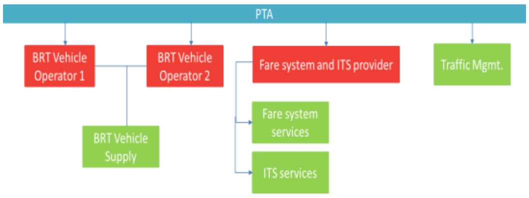
2.5 Fare System and ITS services: Separate vs. Integrated

Options	Separate	Integrated
Structure	 PTA BRT Vehicle Operator 1 BRT Vehicle Operator 2 BRT Vehicle Supply ITS provider Fare system provider Eq. Supply Eq. Supply O&M O&M	 PTA BRT Vehicle Operator 1 BRT Vehicle Operator 2 BRT Vehicle Supply Fare system and ITS provider Fare system services ITS services
Explanation	PTA launches two separate tenders for a Fare System service provider and an ITS service provider.	PTA launches tender for one Fare System and ITS provider that will be responsible for carrying out Fare System services and ITS services. These include equipment supply and operations & maintenance.
Benefits	• Increased competition from suppliers only able to provide either Fare System services or ITS services	• Possible integration of staff lowering overall costs • Increasingly, both of the services are bundled into an integrated software package • Possible integration of equipment such as BRT vehicle consoles, station computers etc.
Drawbacks	• Additional tender and contract management burden for PTA • Compensation to one service provider required if the other service provider defaults	• PTA cannot individually select both Fare System service provider and ITS service provider

Recommendation:

It is recommended to integrate the Fare System and ITS services. Public Transport Authority can launch a tender for selecting a fare system provider responsible for providing both the Fare System and ITS services. This will include responsibility for the equipment supply and operation & maintenance. The equipment can be subsidized by Public Transport Authority in the form of milestone payments upon full service acceptance and can be financed using the ADB loan.

2.6 Traffic Management Services and Fare System and ITS provider: Integrated vs. Separate

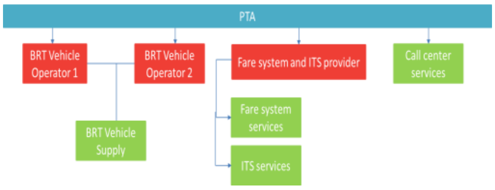
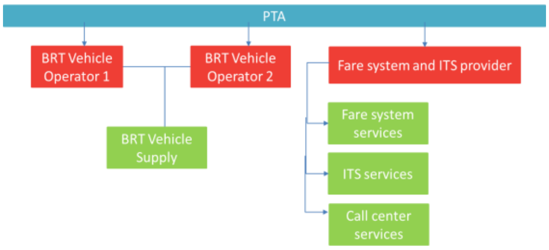
Options	Integrated	Separate
Structure	 PTA BRT Vehicle Operator 1 BRT Vehicle Operator 2 BRT Vehicle Supply Fare system and ITS provider Fare system services ITS services Traffic Mgmt.	 PTA BRT Vehicle Operator 1 BRT Vehicle Operator 2 BRT Vehicle Supply Fare system and ITS provider Traffic Mgmt. Fare system services ITS services

Options	Integrated	Separate
Explanation	Traffic Management Services are integrated within the scope of work to be carried out by the Fare System and ITS provider.	PTA launches a separate tender to carry out Traffic Management Services
Benefits	• Simpler tender procedure • Better integration and coordination of traffic and BRT functions • Elimination of potential unwanted competition in the control center over private and public vehicle movement	• Traffic Management Services can directly communicate with the buses via embarked transit signal priority transmitters and thereby does not require integration with ITS services. • Separate contract allows for the tender to be done at a later stage and keep PTA focused on the core BRT functions
Drawbacks	• Knowledge and expertise for Traffic Management Services are different from Fare System services • Large capital costs for traffic management services integrated in Fare System and ITS provider bids drives choice of best overall bid whereas it is a non-essential of BRT operations • Bidders are required to form larger consortia to cover a larger scope of services • Risk of low bidder participation	• Additional tender and contract management burden for PTA • Less integration of management between private vehicles and the BRT system, resulting in misplaced priorities and a reduction in BRT system efficiency • Higher operating costs of the control center, as administrative and other functions are duplicated

Recommendation:

It is recommended to separate Traffic Management Services from the Fare System and ITS provider's scope of work. At this stage, it is not advised to include traffic management services in the procurement process. These services require heavy investment in equipment and infrastructure, which is not justified at this stage by the envisaged intensity of operation. Moreover, traffic management services are not core BRT functions and procuring them may take away the focus from getting a functional BRT system in place.

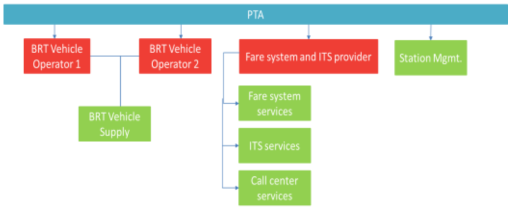
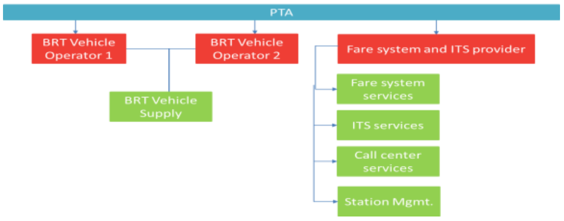
2.7 Call Center Services and Fare System and ITS provider: Separate vs. Integrated

Options	Separate	Integrated
Structure	 PTA BRT Vehicle Operator 1 BRT Vehicle Operator 2 Fare system and ITS provider Call center services BRT Vehicle Supply Fare system services ITS services	 PTA BRT Vehicle Operator 1 BRT Vehicle Operator 2 Fare system and ITS provider BRT Vehicle Supply Fare system services ITS services Call center services

Options	Separate	Integrated
Explanation	PTA launches a separate tender to carry out Call Center services.	Call Center services are included in the scope of work to be carried out by the Fare System and ITS provider.
Benefits	• Skillset required for management of call center operations is different from Fare System and ITS services • PTA has direct control over the choice of the Call Center service provider	• Improved customer experience as all functions are integrated ensuring availability of latest information regarding fares, schedules, fare media cards etc. • Staff can be trained for multiple tasks to cover for their colleagues during breaks, emergencies etc.
Drawbacks	• Call center operations will not have real-time information regarding BRT operations	• Bidder needs to form larger consortia to cover larger scope of services

Recommendation: It is recommended to integrate Call Center services within the Fare System and ITS provider's responsibilities.

2.8 Station Management: Separate vs. Integrated

Options	Separate	Integrated
Structure	 PTA BRT Vehicle Operator 1 BRT Vehicle Operator 2 Fare system and ITS provider Station Mgmt. BRT Vehicle Supply Fare system services ITS services Call center services	 PTA BRT Vehicle Operator 1 BRT Vehicle Operator 2 Fare system and ITS provider BRT Vehicle Supply Fare system services ITS services Call center services Station Mgmt.
Explanation	PTA launches a separate tender for Station Management Services.	Station Management Services are integrated within the scope of work to be carried out by the Fare System and ITS provider.
Benefits	• PTA has direct control over the choice of station manager	• Fare System services depend on power and network connectivity provision, cleaning and maintenance of the hardware and station security, all covered by station management services • Improved passenger experience at the stations can drive fare collection • Staff can be trained for multiple tasks to cover for their colleagues during breaks, emergencies etc.
Drawbacks	• Possible interparty issues since fare collection services are directly dependent upon station management services	• Bidders are required to form larger consortia to cover a larger scope of services

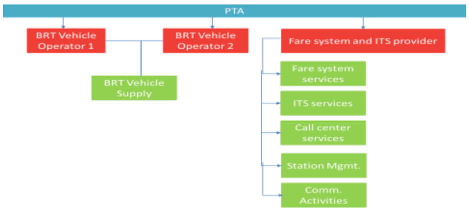
Options	Separate	Integrated
	• Greater risk of fare evasion • Additional tender and contract management burden for PTA	

Recommendation:

It is recommended to integrate Station Management Services within the Fare System and ITS provider's responsibilities.

2.9 Commercial Activities: Integrated vs Separate

<table>
<tr><th>Options</th><th>Integrated</th><th>Separate</th></tr>
<tr><td>Structure</td><td>



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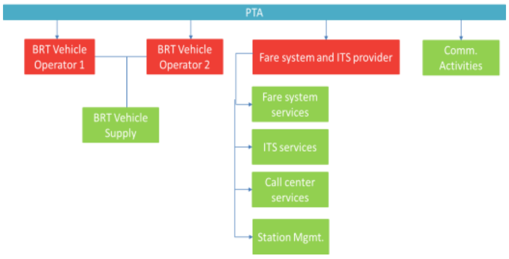


</td></tr>
<tr><td>Explanation</td><td>Commercial Activities are integrated within the scope of work to be carried out by the Fare System and ITS provider.</td><td>PTA launches a separate tender to carry out all commercial activities across the stations.</td></tr>
<tr><td>Benefits</td><td></td><td>

- PTA has direct control over the choice of the commercial shops, parking facilities etc.
- No interface issues as commercial spaces are not to be present on the stations

</td></tr>
<tr><td>Drawbacks</td><td>

- Bidders are required to form larger consortia to cover a larger scope of services
- Commercial revenues expected to be limited and will not be attractive for the bidder

</td><td>

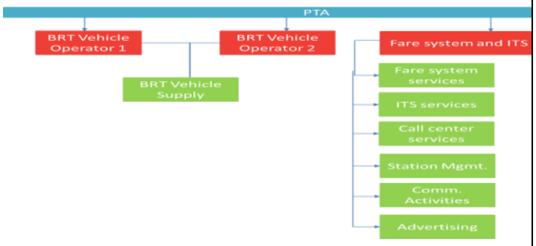
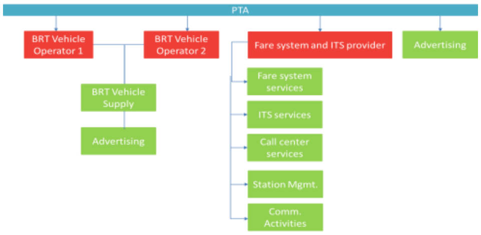
- Additional tender and contract management burden for PTA
- Creates opportunity for corruption

</td></tr>
</table>

Recommendation:

It is recommended for Public Transport Authority to launch a separate tender for Commercial Activities.

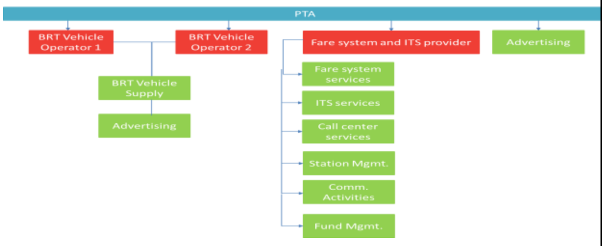
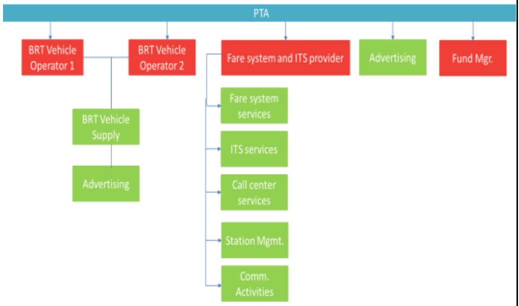
2.10 Advertising Activities: Integrated vs Separate

Options	Integrated	Separate
Structure	 PTA BRT Vehicle Operator 1 BRT Vehicle Operator 2 Fare system and ITS BRT Vehicle Supply Fare system services ITS services Call center services Station Mgmt. Comm. Activities Advertising	 PTA BRT Vehicle Operator 1 BRT Vehicle Operator 2 Fare system and ITS provider Advertising BRT Vehicle Supply Advertising Fare system services ITS services Call center services Station Mgmt. Comm. Activities
Explanation	Advertising Activities are integrated within the scope of work to be carried out by the Fare System and ITS provider.	PTA is directly responsible or carries out a tender for advertising at stations whilst advertising in buses is under the responsibility of the vehicle operators.
Benefits	• Private sector is better positioned to create value from advertising spaces	• PTA has direct control over the choice of the private entity to carry out Advertising Activities
Drawbacks	• PTA has less control over the content of adverts • Advertising will not be taken into account by the private entities in their bids • Advertising is expected to be very low in the beginning and won't be an attractive parameter for the bidders	• Creates opportunity for corruption • Additional tender and contract management burden for PTA • Advertising is expected to be very low in the beginning and won't be an attractive parameter for the bidders

Recommendation:

It is recommended for PTA to take responsibility for advertising at stations as scope of advertising is expected to be very low in the beginning to garner interest from bidders. The PTA will have direct control over the choice of advertising and less contract management burden.

2.11 Fund Management: Integrated vs. Separate

Options	Integrated	Separate
Structure	 PTA BRT Vehicle Operator 1 BRT Vehicle Operator 2 Fare system and ITS provider Advertising BRT Vehicle Supply Advertising Fare system services ITS services Call center services Station Mgmt. Comm. Activities Fund Mgmt.	 PTA BRT Vehicle Operator 1 BRT Vehicle Operator 2 Fare system and ITS provider Advertising Fund Mgr. BRT Vehicle Supply Advertising Fare system services ITS services Call center services Station Mgmt. Comm. Activities

Options	Integrated	Separate
Explanation	Fund Management responsibilities are integrated with the scope of services of the Fare System and ITS provider.	PTA launches a separate tender for a Fund Manager
Benefits	• Data required to feed the payment formulae results from the EFC and ITS services in any case	• Introduces a check and balance system with regulated financial institution • Provides additional comfort to all stakeholders
Drawbacks	• Lack of transparency	• Additional tender and contract management burden for PTA

Recommendation:

It is recommended for Public Transport Authority to launch a separate tender to hire a locally established, reputable financial institution to carry out the role of Fund Manager.

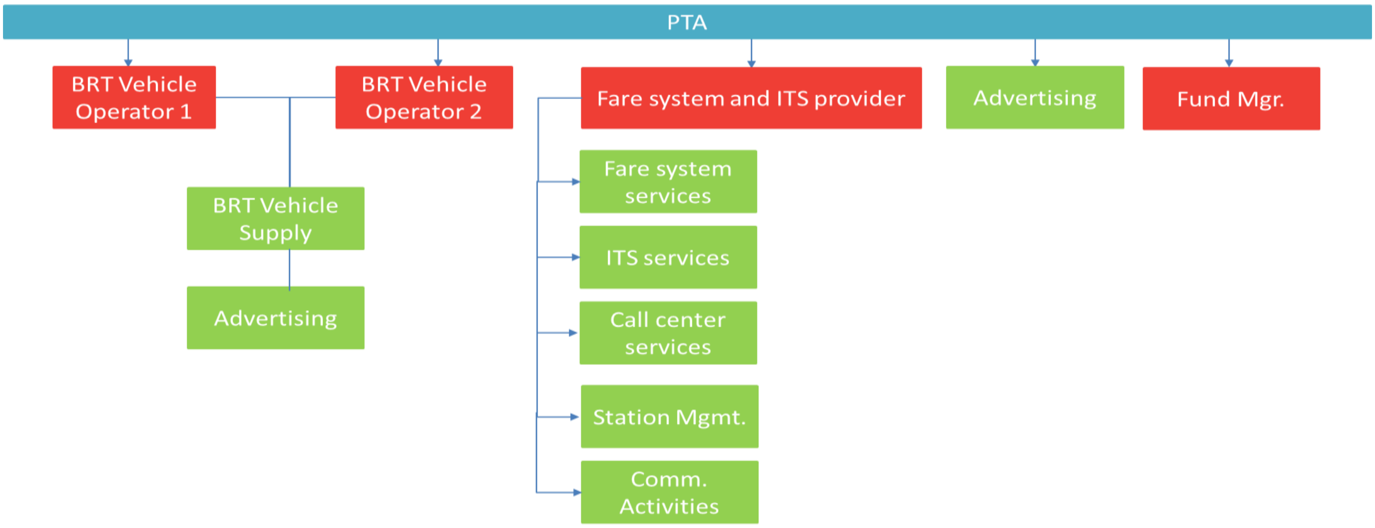
3. Conclusions

3.1 Final proposed deal structure

Under the proposed deal structure, Public Transport Authority will launch the following tenders:

- Two-lot tender for BRT vehicle operators;
- Tender for Fare System and ITS provider;
- Tender for Commercial Activities provider; and
- Tender for fund manager

At a later stage, a separate tender can be launched for traffic management services.



3.2 BRT Business Entities

The table below outlines the various responsibilities of the business entities involved in the final proposed deal structure:

Business Entities	Responsibilities
Public Transport Authority	• Ultimate responsibility for BRT system delivery • Overall management of contracts with suppliers and service providers • Performance monitoring of the entities such that services are delivered to required quality standards • Setting of rules for emergencies and special events • Scheduling of BRT vehicle operations • Effective management of interparty challenges • Setting of rules for Fare System scheme to ensure transparency and level playing field
BRT Vehicle Operators	BRT Vehicle Operator 1: • Procurement of BRT vehicles adhering to specified technical specifications, along with vehicle homologation and licensing, vehicle warranty, spare parts, and tools and diagnostic equipment • Operation of larger proportion of fleet adhering to schedules set by PTA • Dispatchment of BRT vehicles • Selection of drivers, conductors, and other employees • Provision of maintenance services • Provision of BRT system operation training to BRT vehicle drivers • Provision of advertising activities on the interior and exterior of the BRT vehicles BRT vehicle operator 2: • Procurement of BRT vehicles adhering to specified technical specifications, along with vehicle homologation and licensing, vehicle warranty, spare parts, and tools and diagnostic equipment • Operation of smaller proportion of fleet adhering to schedules set by PTA • Dispatchment of BRT vehicles • Selection of drivers, conductors, and other employees • Provision of maintenance services

Business Entities	Responsibilities
	• Provision of BRT system operation training to BRT vehicle drivers • Provision of advertising activities on the interior and exterior of the BRT vehicles
Fare System and ITS provider	• Provision of fare system activities including equipment supply and operation & maintenance of hardware and software components of the system • Issuance of smartcards, provision of top-up services and cash handling • Provision of intelligent transport system activities including equipment supply and operation & maintenance of hardware and software components of the system • Provision of station management services, which include provision of power, water and network connectivity as well as security, cleaning and maintenance of the stations and landscaping • Management of kiosks and other commercial space on the stations • Management of advertising on the stations and the smartcards
Fund Manager	• Auditing of system revenues • Provision of escrow account services • Distribution of funds to due entities

3.3 Preliminary Remuneration Structure

Below is a proposed high-level remuneration structure for each business entity in the BRT operations:

Business Entities	Payment Structure
BRT vehicle operators	Via per bus-kilometer fixed payments paid out in pre-defined time intervals (daily/weekly) from PTA with a minimum revenue guarantee in terms of fixed annual bus-kilometers. A proportion of bus operator revenues can be performance-based payments based on criteria set forth in the contract. Additionally, operators also receive revenues from advertising.
Fare System and ITS provider	Via a combination fixed payments (daily/weekly/monthly) from PTA and a proportion of fare box revenues. Additionally, Fare System and ITS provider also receives revenues from renting of commercial spaces and advertising.

Business Entities	Payment Structure
Fund manager	Via a fixed payment from PTA (daily/weekly/monthly).

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

Output 2.1A Red Line Negotiations with Existing Operators – First Stage

November 2017

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

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List of Abbreviations:

ADB	Asian Development Bank
BRTS	Bus Rapid Transit Service
CDGK	City District Government Karachi
DIG	Deputy Inspector General
GDP	Gross Domestic Product
GOS	Government of Sindh
KBOA	Karachi Bus Owner’s Association
KMC	Karachi Metropolitan Corporation
KPTS	Karachi Public Transport Society
KTC	Karachi Transport Corporation
KTI	Karachi Transport Ittehad
PBS	Pakistan Bureau of Statistics
RTA	Regional Transport Authority
SMTA	Sindh Mass Transit Authority
UTS	Urban Transport Service

Chapter 1.

INTRODUCTION:

1.1 The City of Karachi:

Karachi, having a population of approximately 16 million, is the largest as well as the fastest growing city of Pakistan (PBS, 2017). As the only operational seaport city of Pakistan, Karachi is also the economic hub of the country, contributing approximately 15% to the Gross Domestic Production (GDP) of the entire country (Hasan & Raza, 2015).

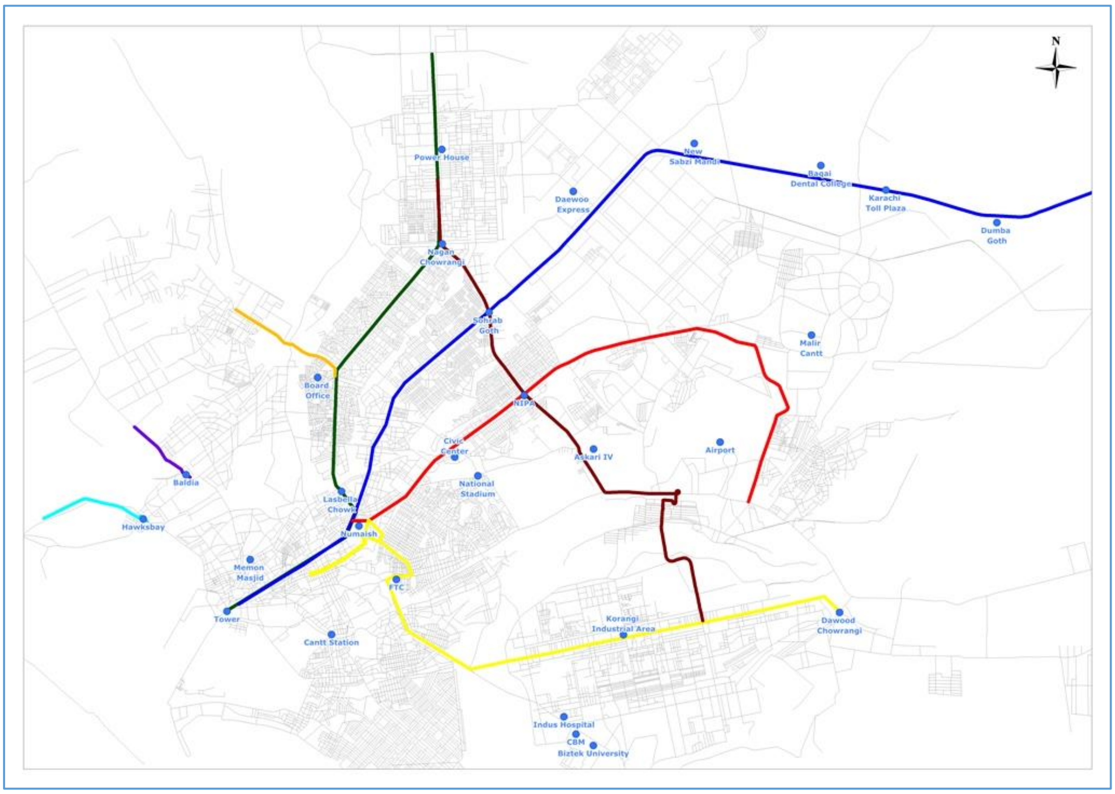
Unfortunately, there is not a single mass transit system to mobilize this large population and support the commercial activities of the city. Instead, the entire city is dependent on a fleet of overaged buses and coaches that have long passed their effective life. The bus fleets are in poor condition, the bus stops are non-existent, the ticketing system is obsolete and the operators compete for passengers which adds to the worsening traffic congestion and safety.

These buses are not just a source of hazard for its passengers and the general traffic, but also a burden on the environment. According to DIG Traffic Saud Ahmed Mirza (Dawn News, 2003), 50% of the road accidents in Karachi are caused by the buses, minibuses, coaches, trucks and water-tankers. Even in the absence of a decent transport system the public, which includes people from the entire cross section of the society, is compelled to use such a deteriorated transport system.

In context of the above scenario, the introduction of BRT lines, shown in figure 1, is the only hope for the long deprived citizens of Karachi.

While the Green and Orange lines are already in their construction phases, the Government of Sindh (GoS) has approved the development of Red and yellow lines along two other major corridors of the city. The map shows the route of all the BRT lines that are either in planning or development phase.

Figure 1: Planned BRT Network of Karachi



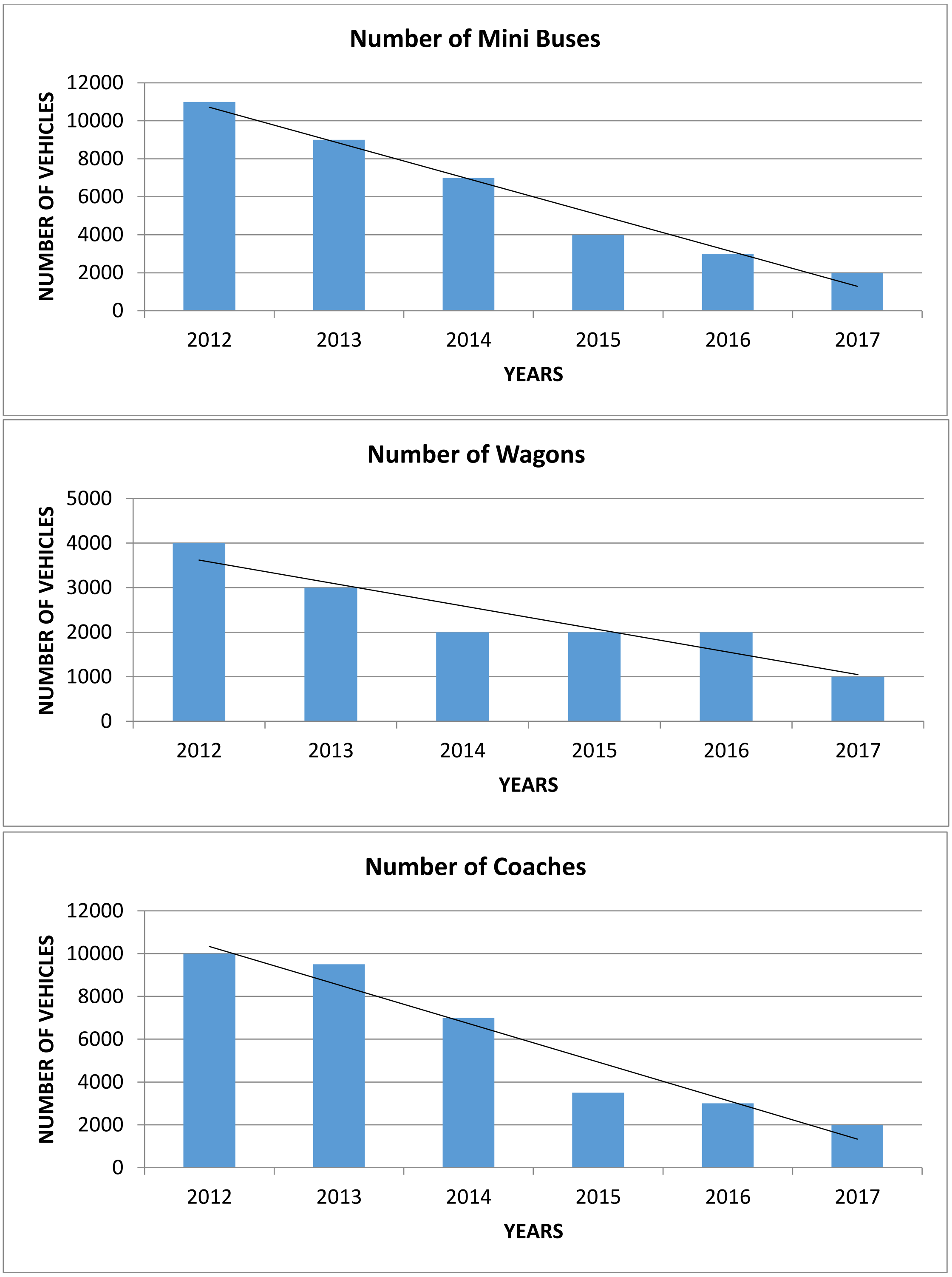
1.2 The Public Transport in Numbers: The Decline

In addition to the worsening conditions of the vehicles, the number of public transport registered buses has also declined sharply from approximately 22,313 in 2011 to less than 9000 in 2016 (Tribune, October 2016)[1]. However, according to unofficial sources, there were less than 6000 vehicles operational in 2016. This decline has further added to the misery of the public, which now struggles to get a decent space in these vehicles. A large number has been compelled to use more expensive modes of transportation such as motor bikes. The figure 2 shows the decline in the size of public transport sector over a period of last 5 years.

---

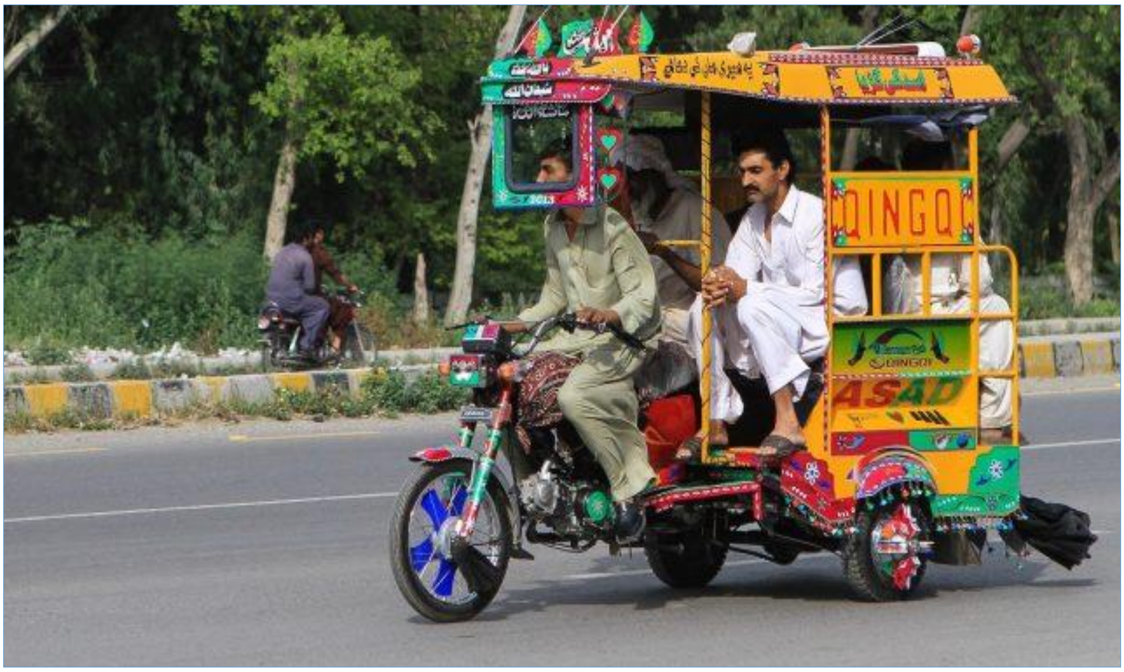
[1] Editorial. (2016, October 18). *Express Tribune News*. Retrieved from Tribune: https://tribune.com.pk/story/1202494/easing-transport-troubles/

Figure 2: Public Transport Decline Chart



One of the major reasons for the significant reduction in the number of buses is the introduction of Qinqis. The Qinqis, Shown in figure 3, are vehicles that are pulled by a motor bike and has a body of a cabin that can carry around 6 to 9 passengers. There are no official sources of data that indicate the actual number of Qinqis currently operating in the city. However, unofficial sources suggest that approximately 50,000[2] Qinqis are currently operating in Karachi. Since these three wheelers are unregistered vehicles, they has been declared unauthorized and illegal transport by the Sindh High Court in 2015[3]. Despite of the ban, these Qinqis still operate in numerous parts of the city. The operations of these Qinqis has added to the troubles of the public transport by taking away a large chunk of their short distance passengers.

Figure 3: Picture of a Qinqi



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[2] Hasan, A. (2015). Responding to the Transport Crisis in Karachi. *IIED.* London: IIED.

[3] *Dawn News*. (2017, March 29). Retrieved from www.dawn.com: https://www.dawn.com/news/1323569

1.3 The Failed Attempts and Reasons:

The local as well as the provincial governments have in past made efforts to address the worsening conditions of public transport. However, all those efforts were both unplanned and mismanaged. Some of those failed attempts have been highlighted below[4].

Due to heavy financial loses the operations of Karachi Transport Corporation (KTC) were closed in 1997. Since most of the routes were still lucrative at the time of closure, the operations of the routes were handed over the newly created Karachi Public Transport Society (KPTS). The KPTS invited private operators to operate on these routes on fixed service charges. The routes were supposed to be served by only large buses. However, the monitoring lapses allowed the operators to operate mini buses and coasters on these routes. Even though the routes operated successfully in the begging, the project failed to achieve its objective of maintaining a decent large bus service in the city. Currently, there only few KPTS routes operating in the city.

Similarly, the City District Government of Karachi (CDGK) launched the Urban Transport Service (UTS) in 2003. The project failed due to multiple reasons. However, one of the fundamental reason for the failure was the lack of involvement of the existing operators of the transport sector in the planning and operations of this scheme. Since the term of loan offered to the transporters by the commercial banks were very attractive, people who virtually had no experience of running the bus operations in Karachi also showed great interest in becoming part of the scheme. The operators acquired the loans from the commercial banks to procure the buses on a condition that the government would subsidize the loan markup. Due to the lack of experience of the operators and the unavailability of funds to further subsidize the mark-up as was agreed upon, the number of buses on the route declined in a very short period of time due to lack of maintenance.

Another project of CNG buses was launched by CDGK in 2009[5]. This time the local government decided to use its own financial resources. The motive behind introducing these buses was to bring modern transport in the city having features such as on-board e ticketing. With the abolishment of the local government system in 2010, the subsequent administrative authority (Karachi Metropolitan Corporation) discontinued the operational model and declined further financial support to the project. As a result, due to the lack of timely maintenance, the fleet of 75 buses deteriorated rapidly. Even though the city desperately needed an additional fleet of buses to accommodate the rising population and to cover the declining number of public transport vehicles, the plan had numerous flaws with respect to its operational sustainability model.

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[4] Some of the information has been collected through informal discussions with a former employee of the Transport and Communication Department.

[5] Hasan, A. (2015). Responding to the Transport Crisis in Karachi. *IIED.* London: IIED.

1.4 Need for Re-Structuring the Public Transport:

It is quite evident from the cases mentioned above that the projects failed, primarily, due to two reasons; insufficient finances to sustain the operations and lack of engagement of the key stakeholder's in the process. Putting the entire scenario in context, the BRTS, which is a mass transit system and requires even heavier investment in infrastructure to operate, also faces a similar fate unless the above-mentioned causes of failure are addressed in the planning of the service.

Even though both of the identified causes of failure weigh equal in importance, this study is directed towards addressing the later cause i.e. engaging the key stakeholders. The success of a BRTS, in particular, is dependent upon its acceptance by the general public. In order to communicate with the public there are various sources and tools that effectively perform the task.

However, in order to address the stakeholders that are expected to be directly affected by the introduction of the BRTS, the engagement and perception management process has to be planned with greater care. The introduction of a BRTS on any given corridor is expected to divert a large chunk of the existing public transport riders to the mass transit service. This reduction in the ridership directly may affect the livelihood of the players that are involved in the operations of the public transport.

Therefore, instead of treating these key players as competitors of the BRTS, the Sindh Mass Transit Authority (SMTA) has decided to identify and engage the key players from the existing public sector in the planning and operations of the mass transit service. The objective is to minimize the losses of the deserving stakeholders by either accommodating them in the mass transit system or by offering certain compensation plans.

This study was designed to develop a detailed understand of the system under which this industry is currently operating. The study included an extensive survey that was designed in such a way that it provided a comprehensive picture of the socio-economic profiles of the identified stakeholders of the public transport industry. Furthermore, the survey also helped in finding out the exact number of vehicles that are currently operating and the personal details of the people associated with those vehicles. The survey for the details regarding the ancillary businesses associated with the industry, such as the spare parts and repair & Maintenance shops, shall be conducted in the next phase of this study.

In the case of Karachi, where there are approximately 100 public transport routes currently operating with an approximate fleet size of 5000 vehicles (Mini-buses, Coaches, Wagons and Buses), the process of engaging such a large number of players from the industry is a very difficult task. In order to address this issue the project of engaging the industry stakeholders was divided into phases. This report is a part of the Red and Yellow line BRTS plan and therefore shall limit the study of stakeholders that are operating on the Red and Yellow line corridors. This study, however, is expected to set a benchmark for similar studies on public sector institutes.

Chapter 2.

PLANNING THE STUDY

2.1 The Objective of the Study:

Keeping in consideration the given scenario of the public transport of the city and the nature of attempts that have been made to address those issues, it is obvious that the sector is in desperate need of a restructuring plan. As evident from the reasons for the failure of the attempts to revive the public transport, it is critical to engage and accommodate the deserving players/stakeholders of the industry/sector to make the outcome more sustainable and acceptable.

However, it is equally important that the negotiating team hold a strong footing with respect to having the knowledge of the prevalent conditions and model of operations of the entire sector before entering into any discussions or negations with any of the identified players. The purpose of this study, therefore, is to paint a holistic picture of the entire industry in such a way that the negotiating team prepares well enough to engage the stakeholder in any sort of discussions, specifically, with respect to the impact of the BRTS on the livelihood of these stakeholders.

This report is based on the results of a detailed socio-economic survey of the key stakeholders (Owners, Drivers and Conductors) of vehicles that operate on the Red and Yellow Line corridors, shown in figure 1. The survey results have been analyzed to determine the most relevant information and trends.

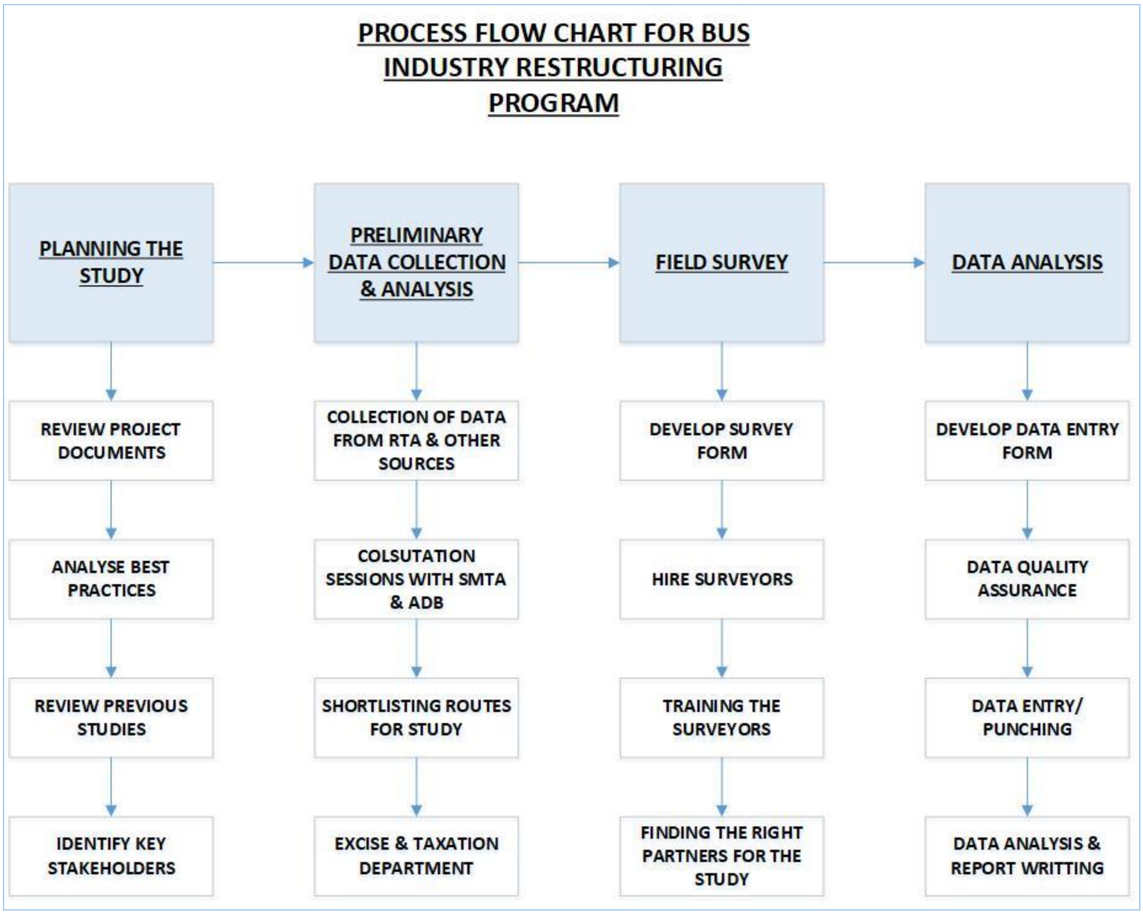
2.2 Setting the Scope of the Study:

The lack of precedence for such a study and the size of the transport sector make it very challenging for the planners to attempt the restructuring of the entire industry without having appropriate benchmarks in sight. The restructuring plan has therefore been initially confined to the public transport routes operating only on the Red and Yellow line corridors. The purpose of planning the study in phases is to develop a knowledge pool for similar projects and to also make appropriate improvements to the process in the due course of time.

2.3 The Methodology of Study

The methodology of study, shown in figure 4, was developed in such a way that it ensured the quality of work and a timely submission of the report to the client.

Figure 4: Process Chart of the Study


PROCESS FLOW CHART FOR BUS INDUSTRY RESTRUCTURING PROGRAM
PLANNING THE STUDY
PRELIMINARY DATA COLLECTION & ANALYSIS
FIELD SURVEY
DATA ANALYSIS
REVIEW PROJECT DOCUMENTS
ANALYSE BEST PRACTICES
REVIEW PREVIOUS STUDIES
IDENTIFY KEY STAKEHOLDERS
COLLECTION OF DATA FROM RTA & OTHER SOURCES
COLSUTATION SESSIONS WITH SMTA & ADB
SHORTLISTING ROUTES FOR STUDY
EXCISE & TAXATION DEPARTMENT
DEVELOP SURVEY FORM
HIRE SURVEYORS
TRAINING THE SURVEYORS
FINDING THE RIGHT PARTNERS FOR THE STUDY
DEVELOP DATA ENTRY FORM
DATA QUALITY ASSURANCE
DATA ENTRY/ PUNCHING
DATA ANALYSIS & REPORT WRITTING

2.4 Planning the Survey

2.4.1 Reviewing Project Documents

In order to set the scope of the study, some previously completed projects were reviewed to take an account of the best practices done in the past on similar lines. Such type of surveys and negotiation activities have never been done in Karachi. Issues such as the unpredictability of the law and order situation, the strong ethnic divide and the remoteness of the locations of the terminals make the city of Karachi one of the most difficult places to perform such a study.

2.4.1.1 Analyzing the Case of Industry Restructuring in Peshawar:

Since the city of Peshawar is also gearing up for its first mass transit service, it is the first city in Pakistan that has developed a restructuring plan for the city's public transport sector. Even though the studies done in Peshawar are quiet similar to those required for Karachi, there are lots of things that are specific to the city of Karachi that require unique solutions. The public transport Industry in Peshawar is not as large as it is in Karachi and neither is it coupled with the strong socio-political influences. The uniformity in ethnicity, the effectiveness and control of the administrative authorities, the size the industry, all make it easier to develop such a plan for the city like Peshawar.

Even though the approach and methodology adopted for the study by the team working in Peshawar is found to be very effective, the challenging dynamics of Karachi demanded more creative thoughts to plan such a study in the city. Some of the city specific challenges and the unforeseen issues have been highlighted in the later sections of the report.

2.4.2 Identifying the Key Stakeholders:

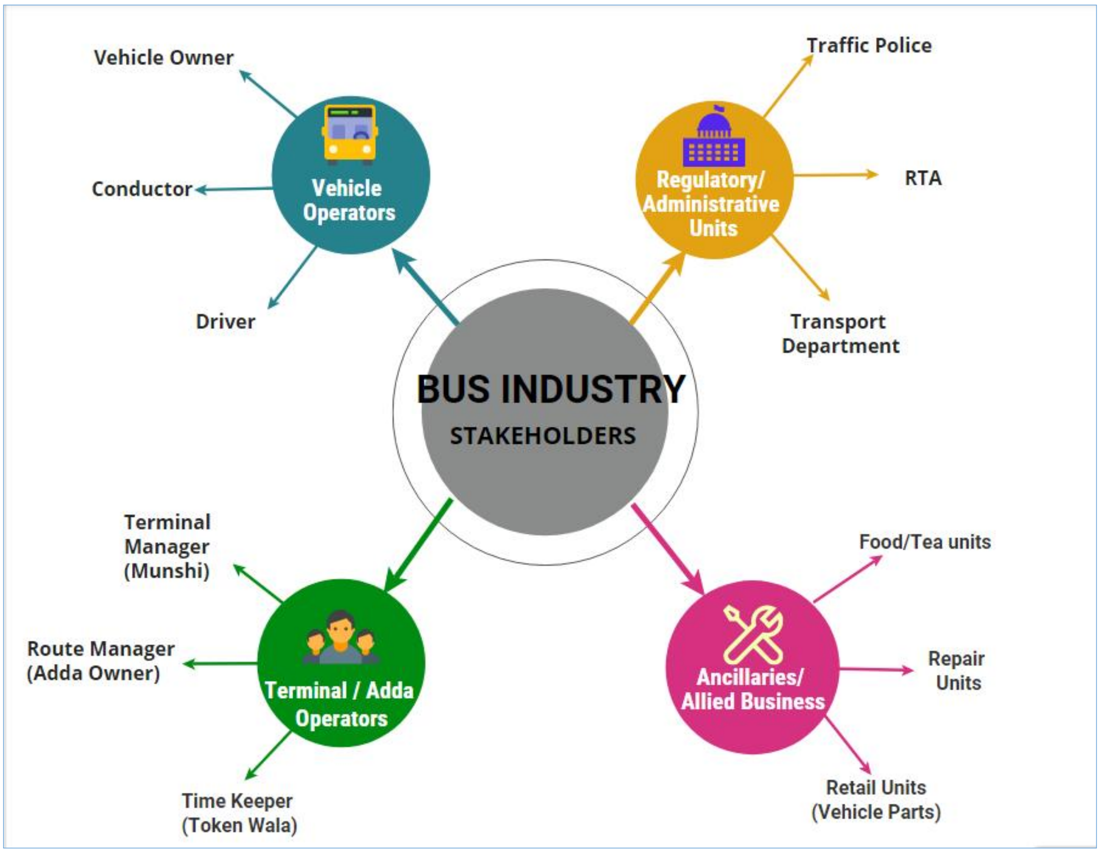
In order to develop a restructuring plan, the first thing that was needed to be done was the identification and categorization of the stakeholders of the public transport industry. Figure 5 shows the stakeholders that were identified and categorized according to the roles that they are playing in the operations of the industry. The four identified groups are as follows:

1. **Vehicle Operators:**
    a) Owner,
    b) Driver
    c) Conductor
2. **Route Operators:**
    a) Route Manager,
    b) Terminal Manager (Munshi)
    c) Time Keeper (Token Wala)

3. **Ancillary/Allied Businesses:**
    a) Repair & maintenance shops,
    b) Spare parts shops,
    c) Food, tea & tuck shops.
4. **Regulatory/Administrative Units:**
    a) Regional Transport Authority
    b) Traffic Police
    c) Transport Department.

Even though each of these stakeholders hold significance importance because of the role they play, the team of "Vehicle Operators" act as the back bone of this industry. The team of vehicle operators provide the essential human and financial capital to operate such a large network of vehicles.

Figure 5: Identified Stakeholders


Vehicle Owner
Conductor
Vehicle Operators
Driver
Traffic Police
RTA
Regulatory/ Administrative Units
Transport Department
BUS INDUSTRY
STAKEHOLDERS
Terminal Manager (Munshi)
Route Manager (Adda Owner)
Terminal / Adda Operators
Time Keeper (Token Wala)
Food/Tea units
Repair Units
Ancillaries/ Allied Business
Retail Units (Vehicle Parts)

2.5 Preliminary Data Collection:

2.5.1 Collecting Route Specific Data from RTA:

This phase of the project included collecting route specific data from the most authentic sources. Such a data is generally available only with the relevant government departments and a few independent research firms. In the case of Karachi, the Regional Development Authority (RTA) administers the affairs of the public transport in the city. Even though the data was readily available with the RTA, unfortunately, the data was not very accurate in most of the cases.

Since RTA was the only official source of data related to the public transport, the preliminary route selection and shortlisting had to be done using the figures mentioned on the RTA's documents. According to RTA, there were approximately fifty routes operating along the red and yellow line corridors. The details with respect to each of these routes are available in the annexures.

2.5.2 Shortlisting the Routes for Survey:

In order to identify and shortlist the routes that were expected to be affected the most by the introduction of the BRT lines, a criterion for shortlisting had to be established. The shortlisting was done primarily on the basis of the following:

1. **Percentage overlap of the public transport routes with the BRTS corridor**
2. **Operating fleet sizes of the public transport routes**.

Each of these fifty routes were screen through these parameters and twenty three routes were shortlisted for this study. Table 1 shows the number of routes shortlisted on both Red and Yellow line corridors.

Table 1: Shortlisted Routes for Study

Percentage Overlap >40%		
No of Bus Routes	Red Line	Yellow Line
	6	13
Percentage Overlap: Between 30-40 %		
No of Bus Routes	Red Line	Yellow Line
	2	2
Total Number of Routes to be Studied		23 Routes
Total Fleet Size of the Shortlisted Routes		1680 Buses (RTA)

The detailed route maps of all the shortlisted routes are shown in the following section.

2.5.3 Public Transport Route Maps: Red Line BRT Corridor

Figure 6: Large Bus Routes along the Red Line BRT Corridor

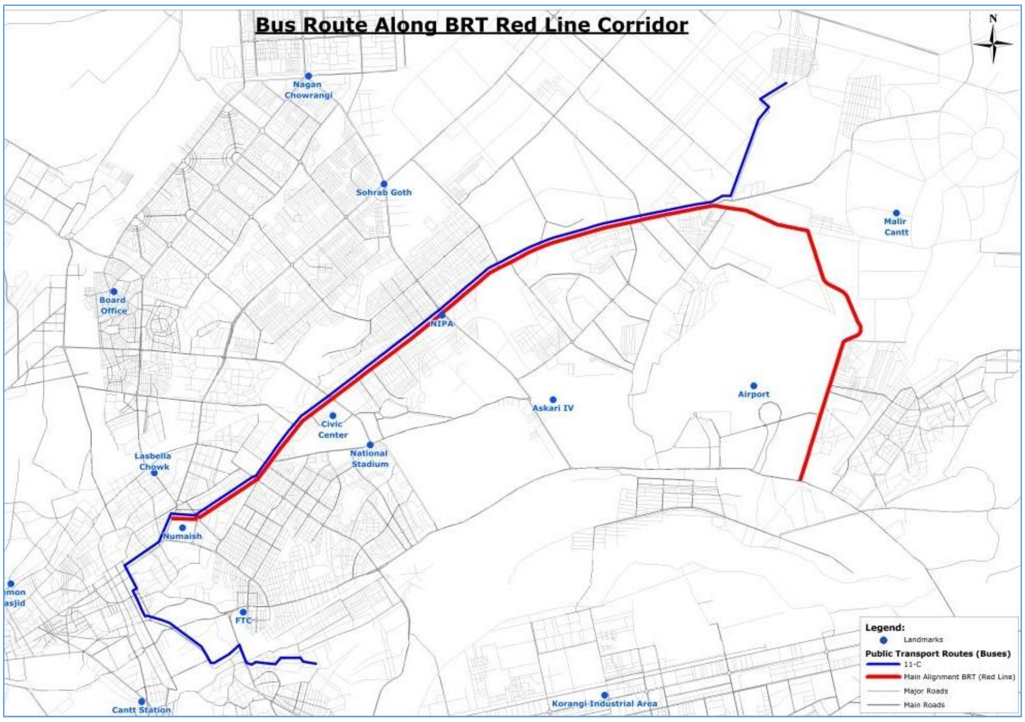


Figure 7: Coach Routes along Red Line BRT Corridor

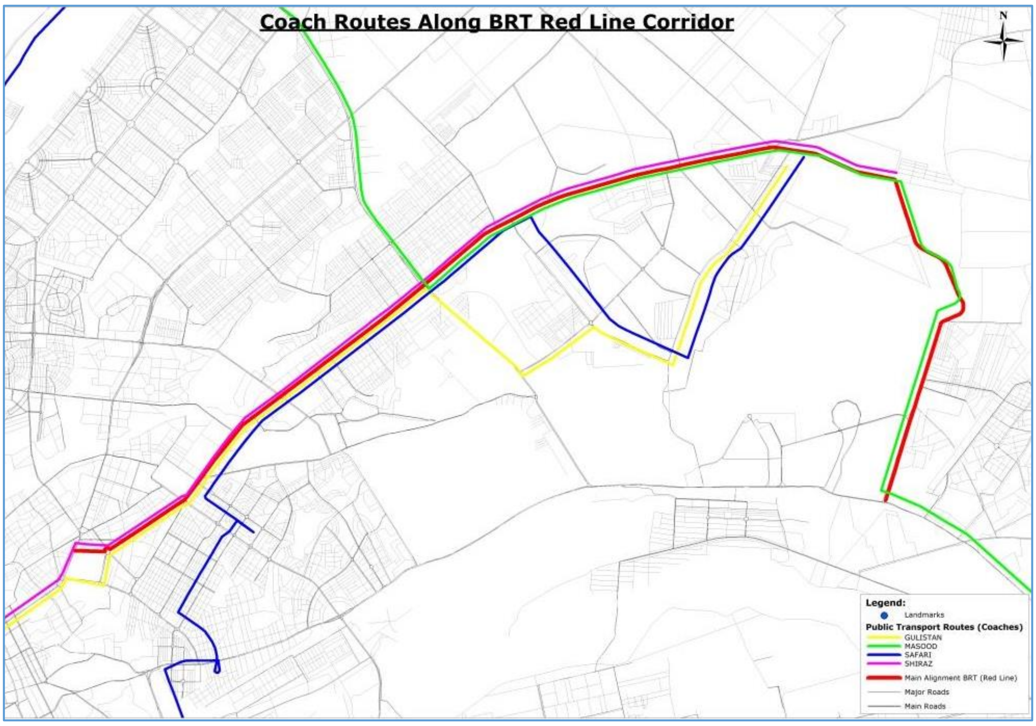
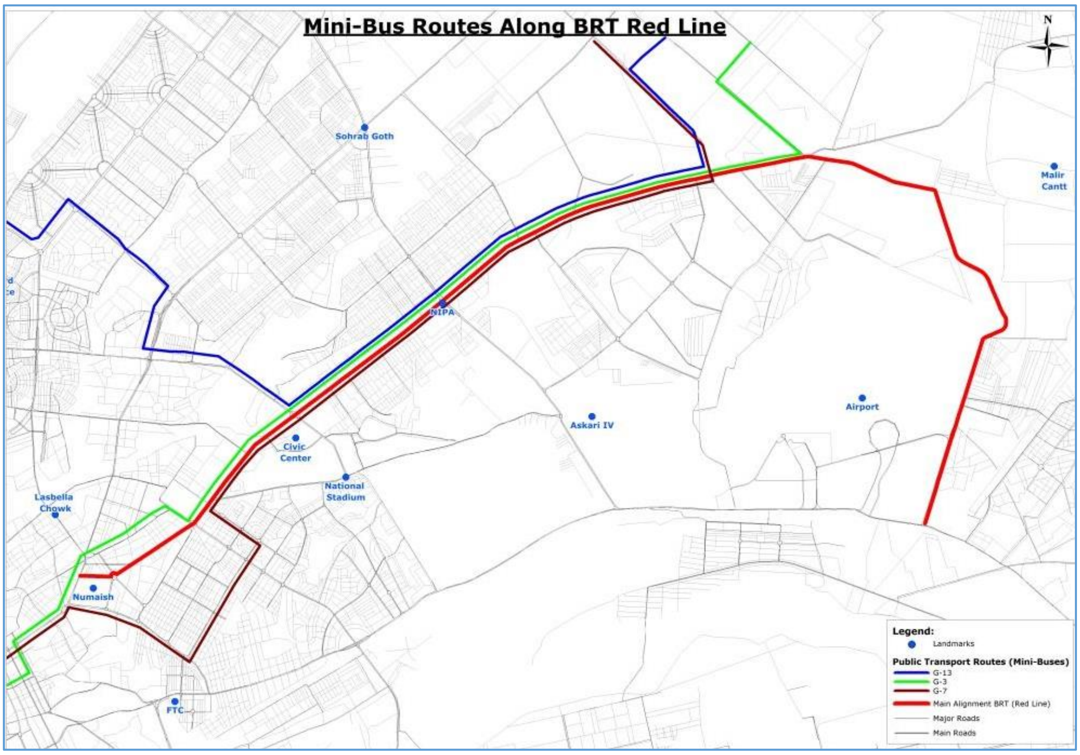

Coach Routes Along BRT Red Line Corridor
N
Legend:
● Landmarks
Public Transport Routes (Coaches)
GULISTAN
MASOOD
SAFARI
SHIRAZ
Main Alignment BRT (Red Line)
Major Roads
Main Roads

Figure 8: Mini Bus Routes along Red Line BRT Corridor



2.5.4 Public Transport Routes Maps: Yellow Line BRT Corridor

Figure 9: Mini Bus Routes along Yellow Line BRT Corridors

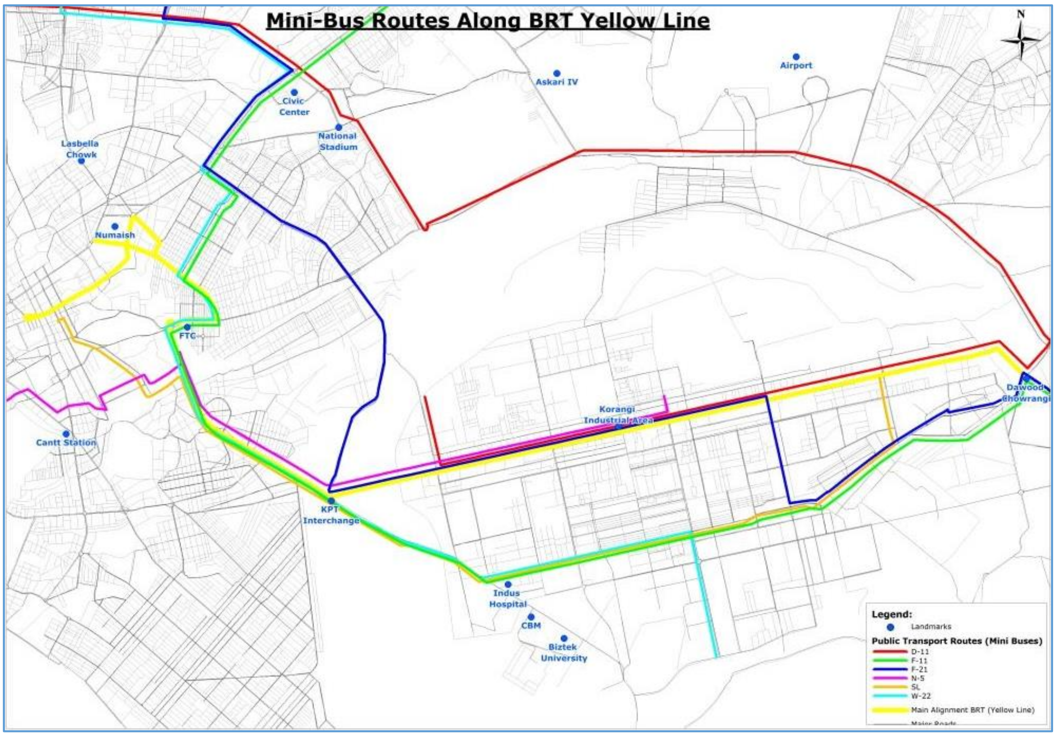


Figure 10: Wagon Routes along Yellow Line BRT Corridors

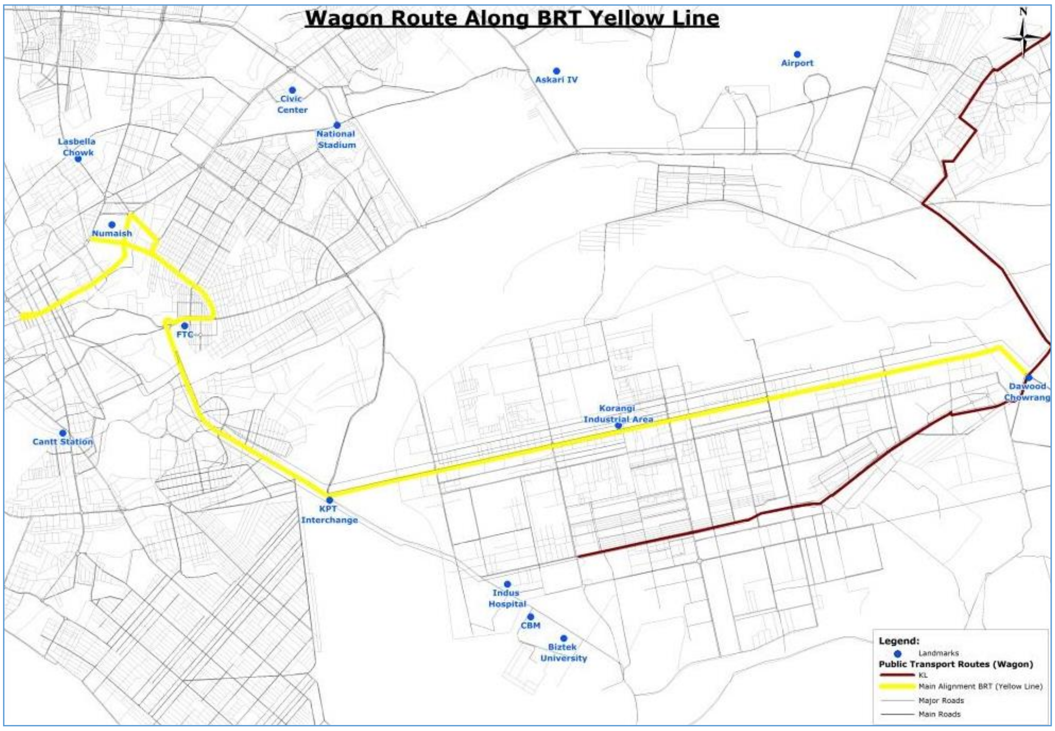
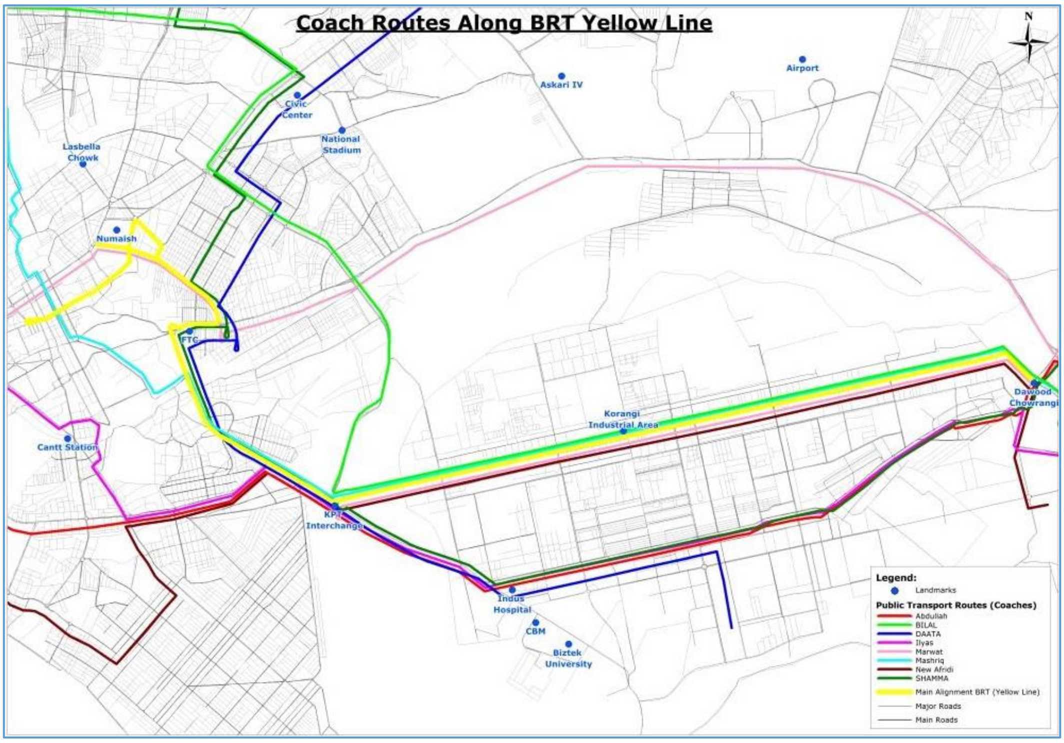


Figure 11: Coach Routes along Yellow Line BRT Corridor



2.6 Field Survey:

2.6.1 Finding Partners for Study:

Since the survey questionnaire was very detailed in nature, the news about the survey activity would have immediately created an environment of uncertainty and insecurity within entire the transport sector. It was therefore important to share the objective of the study with the leaders in the transport community before going into field for the actual surveys. This was the most critical part of the project, since, without taking the leaders of the community in confidence, the survey team would not have been accommodated at any of the Addas' (terminal).

It was very likely that the interviewees would have responded with biasness and exaggeration had they known the actual link between the survey and the BRTS projects. In order to ensure the quality of the data, it was absolutely vital to conceal the actual objective of the study at the initial stages of the Restructuring Plan. Therefore, besides than taking the leaders from the transport sector in confidence, it was equally important to involve partners in the study who could provide the much needed academic outlook to the study. For this purpose the NED University was officially invited as a partner in the study.

Figure 12: Meeting with General Secretary of Transport Ittehad at F-11 Terminal

2.6.2 Developing the Survey Form

To start off with, a particular set of data was collected from the available sources to develop a basic understanding about the working mechanism of the sector. The survey questionnaire was designed on the basis of the structure of the existing transport industry and as per the guidelines provided by the SMAT and ADB. The survey form was divided into five sections;

1. **Vehicle Profile:** Included vehicle specific information such as; Registration ID, Make, Model and the number of Owner, Driver and Conductors.
2. **Owner's Profile:** Owner's personal, professional and family information.
3. **Driver's Profile:** Driver's personal, professional and family information.
4. **Conductor's Profile:** Conductor's personal, professional and family information
5. **Bus Industry Profile:** Operational details and business model

The form was developed in such a way that a comprehensive picture of the interviewee’s personal, family and economic profile could be generated. A sample of a survey form has been attached in the annexures (Annexure 1).

2.6.3 Hiring and Training the Surveyors:

Once the planning was completed, a team of surveyors was to be developed. Since the entire public transport industry is being operated by the Pashtun people, it was binding upon us to hire Pushto speaking people to allow better communication and a level of comfort between the interviewer and the interviewee.

Moreover, Since the form included questions that may generally be considered personal in nature and the fact the Pashtuns, in general, are very reluctant in sharing such information, the hiring of the right people was one of the most critical step. A team of 10 surveyors was hired and trained at the NED University. The profile of the surveyors varied largely; with some engaged in doing masters from the NED University, while others had recently completed matriculate and intermediate.

Figure 13: Picture of a Surveyor Training Session at the NED University

Figure 14: Pictures from the Pilot Survey Day

2.7 Data Management and Analysis

2.7.1 Data Quality Assurance

The forms, collected from the field, were screened through a process of quality assurance. The first step of the process was ensuring the readability of the information. It was followed by performing logical checks on the data. The process also included maintaining a uniformity in data.

As an output of this data quality assurance process, which was initiated along with process of collecting the data from the field, issues such as the unavailability of owners on the terminals and the communication of vehicle lease period, were addressed in time.

The next step of quality assurance process included developing a code theme for the data. The codes were developed in order to categorize the responses in types to provide uniformity in identification of the data. These codes were than marked on all the forms in order to reduce the possibilities of mistakes by the data entry team.

2.7.1.1 Quality Checks in Field

Although the field staff was trained through a proper process, in order to eradicate chances of field chaos and wrong data recording, two relievers (also acting as assistant supervisors) and one site supervisor were associated with the survey team. These assistant supervisors and supervisor randomly took samples and checked the forms in field time and again during the surveys to check quality of data that was being collected. The figure 15 shows the pictures of the survey team engaged in process of the data quality checking in the field.

Figure 15: Pictures of Quality Checks in Field

2.7.2 Data Entry/Filtration

Once each of the form was checked for errors and coding, the forms were entered on an electronic version of the questionnaire that was developed on Microsoft Excel. The data entry team was thoroughly trained and was continuously monitored for quality assurance. Once the data was entered on the excel sheet, the process of data filtration was initiated.

As soon as the data was punched, it was again checked for inconsistencies and logical errors. The complicated nature of data required very strong filtration techniques. Therefore macros were developed on excel that helped in highlighting the most complicated of the typing and logical errors. In case of inconsistencies the data was referred back to the survey forms for final checking and correction. Even, where required, the respective stakeholders were immediately called for clarification. The excise and taxation website was also used to verify the vehicle’s registration related information.

2.7.3 Data Analysis

After the filtration of the data, a detailed pattern for analysis was developed which tested the data for various correlations. The next chapter includes the results from the analysis of the data.

2.5 Project Schedule:

The table 2 below shows the schedule that was followed to complete the project. The dates that were initially set for the completion of each phase of the study were met in most of the cases. However, due to some un-foreseen issues, the schedule had to be revised at some points. Some of the unforeseen issues are listed below:

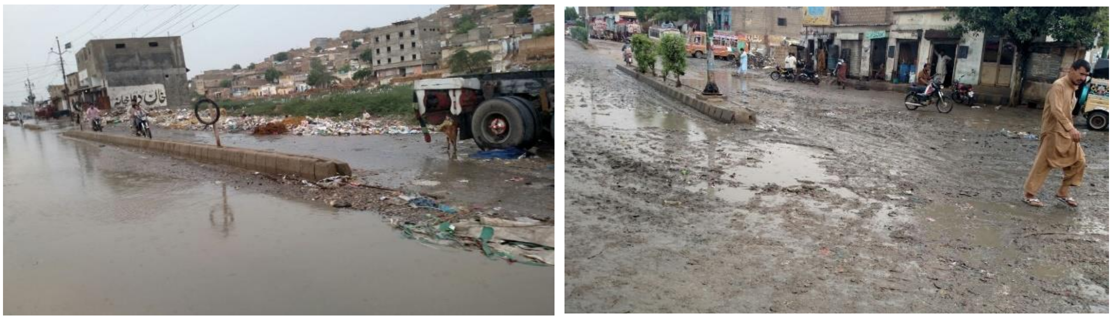
1. Monsoon Rain
2. Oil Tanker’s Strike Call
3. Planning the 2nd Round of Survey for Owners.

Table 2: Project Schedule

SURVEY SCHEDULE		
S No	Dates	Task Performed
1	15th May, 2017 - 31st May, 2017	Collecting & Analyzing Preliminary Data
2	1st June , 2017- 30th June, 2017	Shortlisting Routes for Study & Developing Survey Form
3	25th June, 2017 - 30th June, 2017	Sessions with Community Elders
4	4th July, 2017 - 12th July, 2017	Hiring & Training the Surveyors
5	13th July, 2017 - 10th August, 2017	Field Survey-Driver & Conductors
6	11th August, 2017 - 30th August, 2017	Field Survey-Owners, Data Coding & Correction
7	4th September, 2017 - 30th September, 2017	Data Filtration
8	2nd October, 2017 - 14th October, 2017	Data Analysis
9	16th October, 2017 to 25th October, 2017	Report Writing

The pictures below shows the conditions of the roads after the lengthy spell of monsoon rains. The survey had to be called off at least twice during the survey period due to the heavy rainfall.

Figure 16: Picture of Road Conditions after Monsoon Rain



Chapter 3.

RESULTS AND ANALYSIS

The results of the data that had been collected from the survey has been presented in two sections:

1. **The Bus Industry's Analysis:** This section includes the analysis of the following dimensions of the industry:
    a. Mechanism of Operations
    b. Classification of Vehicles
    c. Vehicles related Details
    d. Mechanism of Business

2. **The Vehicle Operators Profile Analysis:** This section includes the results for the socio economic profile of the stakeholders associated with a vehicle i.e.
    a. Owners
    b. Drivers
    c. Conductors.

3.1 Bus Industry Analysis

This section highlights the overall operations and business mechanism of the daily public transport industry. There are multiple stakeholders associated with the public transport industry (Shown in figure 5). These stakeholders form a complete industry and a connected livelihood chain. This study has divided these stakeholders into four categories.

1. **Vehicle Operators:**
    d) Owner,
    e) Driver
    f) Conductor
2. **Route Operators:**
    d) Route Manager,
    e) Terminal Manager (Munshi)
    f) Time Keeper (Token Wala)
3. **Ancillary/Allied Businesses:**
    d) Repair & maintenance shops,
    e) Spare parts shops,
    f) Food, tea & tuck shops.
4. **Regulatory/Administrative Units:**
    d) Regional Transport Authority
    e) Traffic Police
    f) Transport Department.

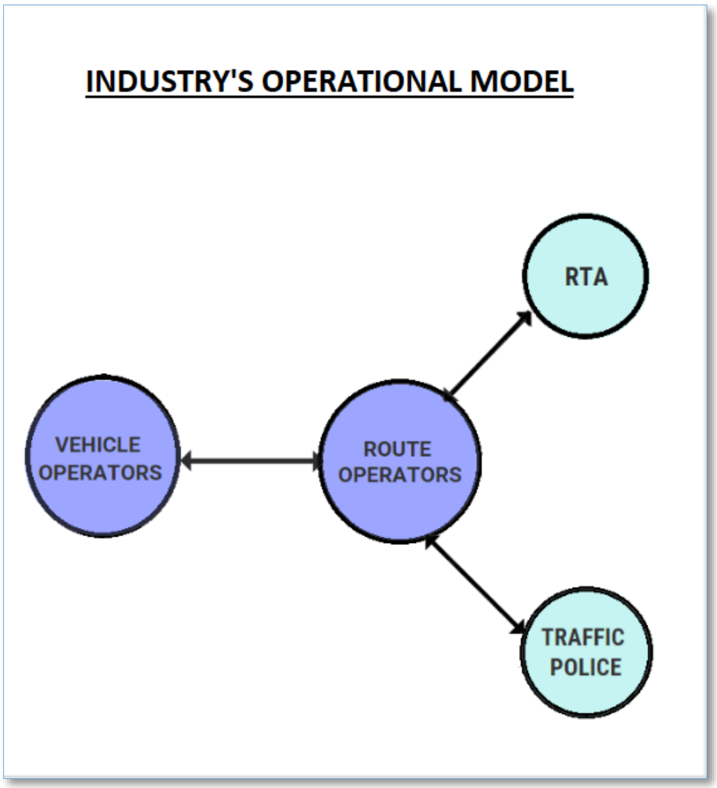
3.1.1 The Industry's Operational Mechanism:

The figure 17 below illustrates the role played by each of the above identified stakeholders in running the public transport of the city. The solid lines indicate the prevalent mechanism of coordination between the stakeholders.

In the prevalent system, the Route Operators plays the key role of coordinating and managing the affairs of the industry's operational planning. The route manager, a character not found in the official model, plays the pivotal role of managing and planning the route operations. The route manager, also known as the route owner, has a team (Munshi & Book keeper), which manages the operations and financial matters of the route. This team also provides additional services, such as the registration of the vehicle with the RTA and the clearance of challan from the traffic police, to the vehicle operators.

The route managers/owners are generally those people who conceived the existing public transport routes and got it approved from the RTA. Since these route managers manage the terminal space and route operations, they charge each vehicle for operating on their routes, using the terminal facilities and providing the above mentioned services.

Figure 17: Stakeholders Coordination Model



In the given scenario, the private sector seems to be operating quiet independently and has developed mechanisms that are efficient enough to sustain the operations of the industry. The details with respect to the business model of the industry are discussed in the later part of the report.

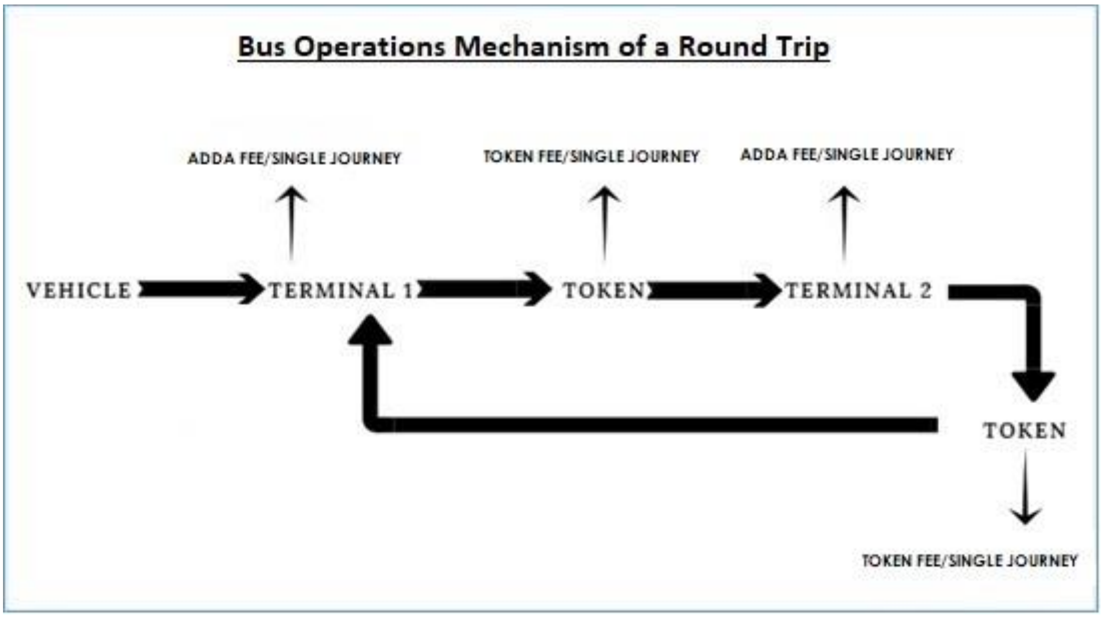
3.1.2 Daily Operations Model:

The key players of the daily public transport operations are as follows:

1. Owner of the vehicle
2. Driver of the Vehicle
3. Conductor of the Vehicle
4. Munshi (Terminal In charge/Book Keeper)
5. Token Wala (Time Keeper)

The above mentioned characters are the people directly involved in managing the daily operations of the public transport. Figure 18 illustrates the mechanism of daily operations and the nature of the involvement of these players at each phase of the operations. Even though the model may vary slightly with each route, the total amount charged at the end of the day is almost the same.

Figure 18: Bus Operations Mechanism (Round Trip)



Every route has two terminals, which are being managed by a Munshi (Terminal Manager) at each end. The job of the Munshi is to manage the frequency of the fleet operations and the financial & administrative affairs of the terminal. Each vehicle pays an adda fee at both of the terminals to collect the coupon for queuing up for operations. The amount of fee charged at each terminal may vary, with the amount ranging between Rs 120-220 per trip per terminal. In most of the cases, the amount of fee charged by the terminal manager (Munshi) reduces with the number of trips. However, at the end of the day each vehicle ends up paying roughly around Rs 450-500 to the terminal managers.

Other than the terminal fee, another fee is charged to each vehicle by the time keepers (Token Wala) stationed on the route. The job of the time keepers is to keep a check on the pace of the fleet and maintain a reasonable time interval between each vehicle. Again, even though the amount of fee charged may vary with each route and trip, each vehicle ends up paying approximately Rs 150-200 per day to these time keepers. The amount of fee charged by the time keeper ranges between Rs. 25-70 per single journey. In some of the cases there are up to two token walas stations on each direction of the route. Other than charging a regular fee, these time keepers also penalize the vehicles on delays in arrival. The amount of penalty may be up to Rs. 25 per minute.

Table 3: Terminal Services and Route Charges

Adda Fee Per Day (PKR)	Token Fee Per Day (PKR)	Total Expense Per Day (PKR)
450	200	650

Figure 19: Pictures of Munshis (Terminal Managers)

3.1.3 Classification of the Vehicles

There are primarily three types of vehicle that are officially operating under the umbrella of public transport i.e. Large Buses, Mini Buses and Coaches. The types of routes that were developed by the administrative authorities were also in accordance with these three categories of vehicles i.e. Bus route, Mini-Bus route & Coach Route. Each of these three types of vehicles were expected to operate on their assigned routes and deliver slightly different nature of transport services. Following are the three type of routes as categorized by the RTA:

1. Bus Routes
2. Mini-Buses Routes
3. Coaches Routes

The table 4 provides an overview of the vehicles that are currently operating as public transport vehicles on the Red and Yellow Lines corridors.

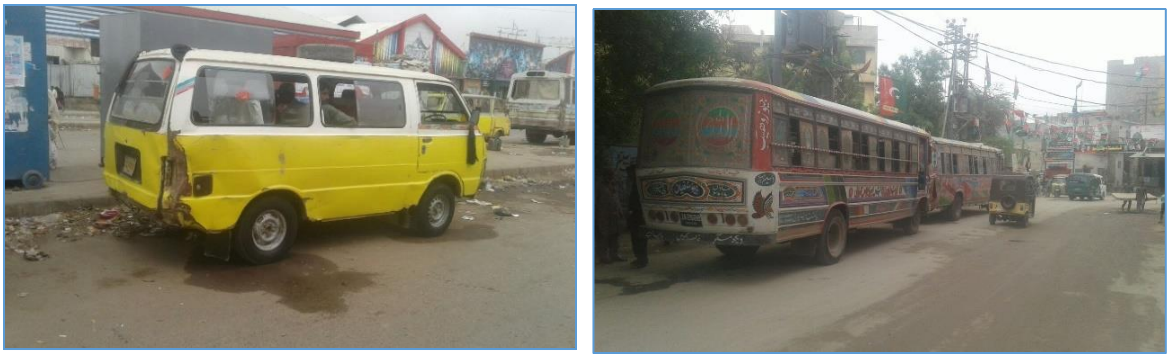
Table 4: An Overview of the Operational Vehicles by Type

Vehicle Type	Make	Seating Capacity	Total Capacity (Seating +Standing)	Model (From-To)	Registration Initials
Large Buses	Bedford	50-55	54	1967-1982	JA, JB, PA
Mini-Buses	Toyota (Wagon)	11-14	14	1974-1982	CP, CL, CB, **JE**
	Mazda-3000 cc	26	41	1970-1987	**JE**
	Mazda-3500 cc	26	41	1989-2010	JE, JF
Coaches	Mazda-3500 cc	26	41	1992-2000	PE

There may be other types of vehicles operating in the city, but the above mentioned vehicles form the majority of the public transport fleet of the city.

It is, however, very important to note that engines of almost all the Mazda 3000 cc buses have replaced by Mazda 3500 cc engines. So technically both mini buses and coaches are currently operating with 3500 cc engines.

Figure 20: Pictures of Types Vehicles in Operation



Mini Bus/Wagon (Toyota)

Bus (Beford)

Coach (Mazda)

Mini-Bus (Mazda)

3.1.3.1 Differentiating Between a Coach and a Mini-Bus

Since these three types of routes were introduced over period stretched over decades, the vehicles that were introduced on these routes were also registered with the Excise and Taxation department accordingly.

As evident from table 5, RTA considers the Mini Buses (Mazda) and Coaches as two distinct services that are expected to operate on their respective routes. In order to establish this difference the Coaches were given names such as "New Afridi Coach, Bilal Coach etc., whereas the Mini Buses were given Alpha-numeric Id's such as D-11, G-13 etc. However, as evident from table 5 and figure 21, over a period of time and with the decline in the quality and quantity of the vehicles, the distinction established by the RTA seems to have been ignored by the operators. Therefore an accurate count of the coaches and mini-buses was not possible using the "route of operations" as a tool to differentiate between these two vehicle types. In order to address the issue of differentiating between the coaches and mini-buses, registration initials were identified as a much accurate source of information.

The Mazda (3500cc) Coaches, which were launched in 1992's Prime Minister Scheme, were given "PE" registration initials by the excise and taxation department. These Mazda coaches were supposed to be an express service making lesser number of stops on its route, with no provision for standing passengers.

The Mini Buses, which were launched much earlier than the coach service, were given "JE" registration initials by the Excise and Taxation Department. These Mini Bus routes were initially operated with 14 seater Toyota "Wagons". Later, in the late 1970's, Mazda's (3000 cc) 26 seater were introduced to increase the passenger accommodation capacity. However same registration initials (JE) were handed over to these Mazdas'. These Mini Buses were supposed to make a standard number of stops on their route. In 1986 issuance of further routes of Mini Bus was stopped due to an incident that involved a mini bus running over a student. Later a new series of reconditioned Mini Buses were registered with "JF" initials by the excise and taxation in year 2000. Currently, some of those "Wagons" and all of the "Mini-Buses" share the same initials (JE & JF). For the purpose of clarity in categorization, this study has labelled the Toyota made "Mini-Buses" bearing "JE" and "JF" registration initials as the "Mini Bus (Toyota)", and have labelled the Mazdas' bearing "JE" and "JF" registration initials as the "Mini Buses (Mazda)".

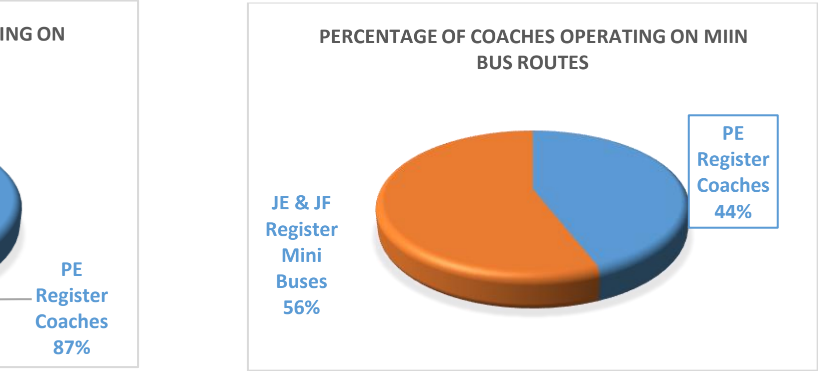
Table 3 below strongly suggests that a number of "JE" registered Mini Buses are operating on the Coaches (PE) routes and so are a number of "PE" registered Coaches operating on the Mini Buses Routes. The tables 5 shows the number of vehicles violating these parameters.

In order to address the issue of establishing the count of vehicles surveyed by type, this study has taken both registration ID initials and the make (appearance) as a criterion to categorize the vehicles.

Table 5: Vehicle Violating RTAs Parameters

	Operating on Coaches Route	**Operating on Mini-Buses Route**
Total Vehicle Surveyed	**490**	**348**
PE Registered Vehicles	424	150
JE & JF Registered Vehicles	66	190
Vehicles Violating Parameters	**66**	**150**

Figure 21: Percentage of Coaches and Mini Buses Violating RTA Rules



3.1.4 Total Vehicles Surveyed

The extensive survey, which lasted for a period of over three weeks, resulted in collection of data of approximately 950 vehicles from 23 routes. Further filtration of the collected data brought the count down to 879 vehicles. Table 6 shows the count of the surveyed vehicle by two different classification approaches.

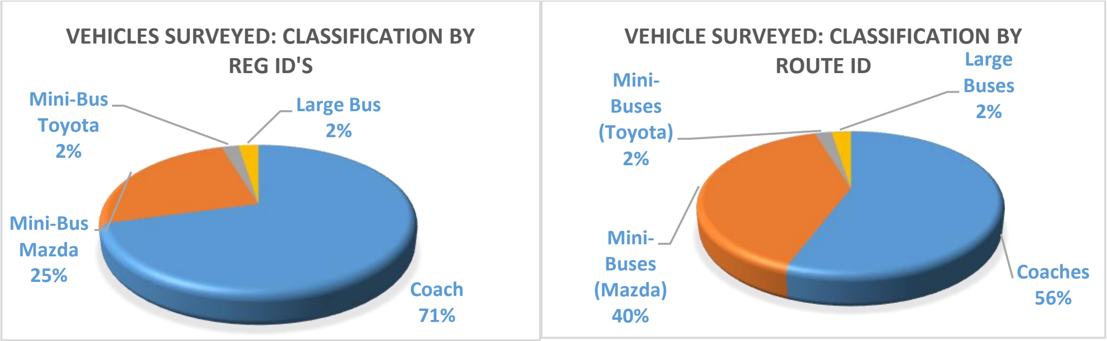
As discussed in the previous section of the report, this study has found the registration initials, rather than the route of operation, as a more appropriate source of classifying and counting the vehicles. However, since the RTA still refers to the later as a criterion for the classifying of the vehicles, it is important to present the count using both approaches.

The table 6 and figure 22 below shows the difference in count and in percentage distribution with respect to each vehicle type by both classification approaches. The significant difference in the count of coaches and Mini Buses (Mazda) is due to the violation of RTA's parameters by the vehicle and terminal operators.

Table 6: Surveyed Vehicle Count: A Comparison

Vehicle Type	Count By: Vehicle's Registration Initials	Count By: Vehicle's Current Route of Operation
Coaches	490	622
Mini-Buses (Mazda)	348	216
Mini-Buses (Toyota Wagon)	19	19
Large Buses	22	22
Total	**879**	**879**

Figure 22: Pie Charts of Vehicle Count by Each Type: A Comparison



Count by Registration IDs:

The table 7 shows a detailed picture of the count of vehicle with respect to their assigned registration initials.

Table 7: Vehicle Classification by Registration OD & Make

Vehicle Classification By Registration ID		
Registration ID	**Vehicle Classification**	**Total Vehicle Surveyed**
PE	Coach (Mazda)	622
JE	Mini-Bus (Mazda)	216
JF		
CB	Mini-Bus (Toyota Wagon)	19[6]
CL		
CP		
JE		
JF		
PA	Large Bus (Bedford)	22
JB		
JA		
	Total	879

Count by Route of Operations

As discussed in the earlier sections of the report, the initial selection and shortlisting of the routes waas done using the data gathered from the RTA.

However, once the survey started, the data collected from the field showed significant variance from one collected from RTA. The table 8 below provides a detailed picture of the count of vehicles surveyed by their current route of operations. Other than the data collected from RTA and the number of vehicle actually surveyed in the field, an additional source of data was identified.

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[6] The survey conducted on the Wagon Route (K-L) was called off early because of the aggressive resistance shown by the vehicle operators.

Each route has a Munshi (Terminal In charge/Book Keeper), who is in charge of the terminal operations. The Munshi manages the frequency of the operations by issuing coupons of the departure time to each of the vehicle that operates from the given route on the given day. The vehicle which is issued a coupon is also listed on a register by the Munshi. This register, which is shown in figure 23, is one of the most authentic sources of information for determining the actual operating fleet on a given day.

Table 8: Vehicle Classification by Route ID

Vehicle Classification By Route ID					
No Of Routes	**Vehicle Category**	**Route Name/ID**	**Vehicle Count (Field Survey)**	**Vehicle Count (Munshi's List)**	**Vehicle Count (RTA's List)**
1	**COACHES**	Illyas Coach	45	68	50
2		New Afridi Coach	56	68	250
3		Bilal Coach	53	74	208
4		Abdullah Coach	39	65	NA
5		Mashriq Coach	52	70	46
6		Sheraz Coach	42	54	114
7		Marwat Coach	85	127	160
8		Gulistan Coach	29	41	39
9		Shama Hasanzai Coach	27	34	48
10		Safari Coach	17	25	98
11		Mehsood Coach	32	42	32
12		Data Coach	13	13	58
1	**MINI-BUSES (Mazda)**	D-11	40	60	35
2		G-7	46	65	80
3		N-5	35	50	30
4		G-3	60	75	60
5		W-22	34	40	48
6		F-11	68	88	120
7		G-13	24	30	20
8		S-L	18	25	10
9		F-21	23	26	70
1	**BUSES**	11-C	22	22	26
1	**MINI-BUSES (Toyota Wagon)**	K-L	19	45	35
Total Fleet Size			**879**	**1205**	**1637**

The significant difference in the number of vehicle surveyed and the number of vehicle on the Munshi's list is due to the fact that each day some of the vehicles reduce the number of trips. The reduction is primarily due to reasons such as the shortage of CNG and Repair & Maintenance. Even though these vehicle show presence on the Munshi's (Book Keeper's) list, the surveyors were not able interview these vehicles.

Figure 23: List of Operational Vehicles Maintained by the Munshis'

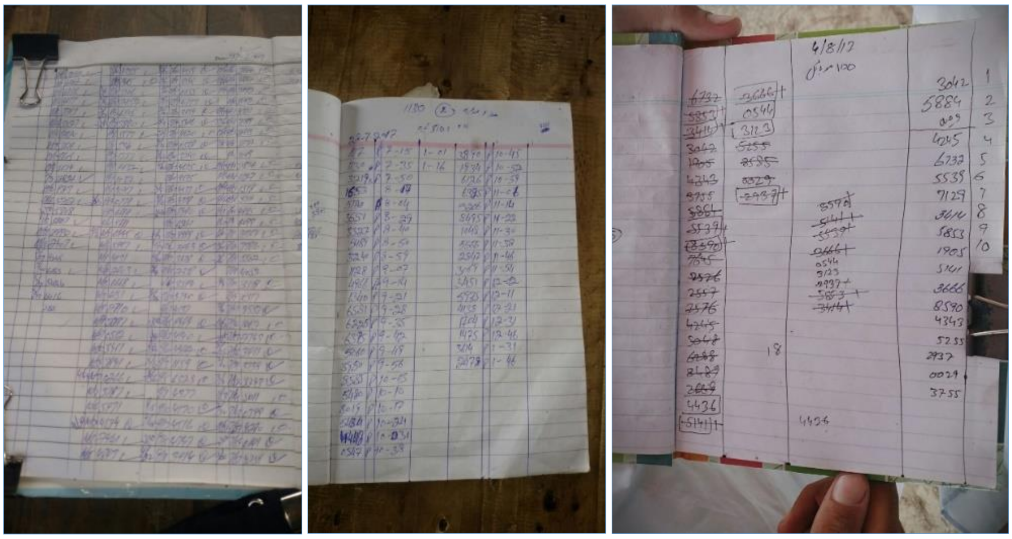


Figure 24: Pictures from Field Survey

3.1.5 Ages of Vehicles:

Figure 25 and 26 show the average age of the vehicles that are operational on the Red and Yellow Line corridors with respect to the vehicle's registration id and route id classification, respectively. The significant difference in the Mini Bus ages in both the counts is due to the fact that the count by route of operations include a large number of Coaches, which reduced the average age of the Mini Buses.

The figures verify/authenticate the data shown on table 4. The large Buses are the oldest in the stock, followed by the Toyota wagons and the Mazdas' (3000 cc) Mini Buses. Mazda (3500 cc) coaches were the latest to enter the fleet. As discussed earlier in the report, the engines of almost all 3000 cc vehicles have been replaced with 3500 cc engines.

Figure 25: Average Age of Vehicles by Registration ID Count

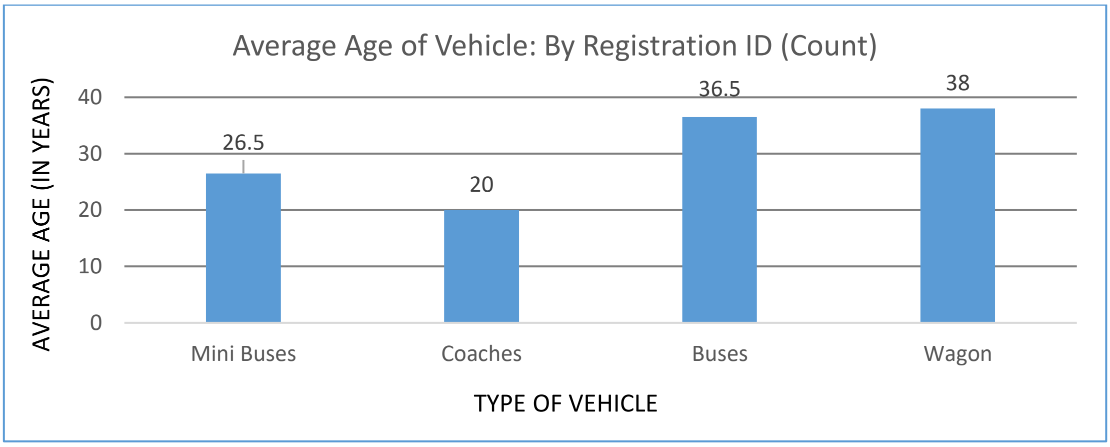
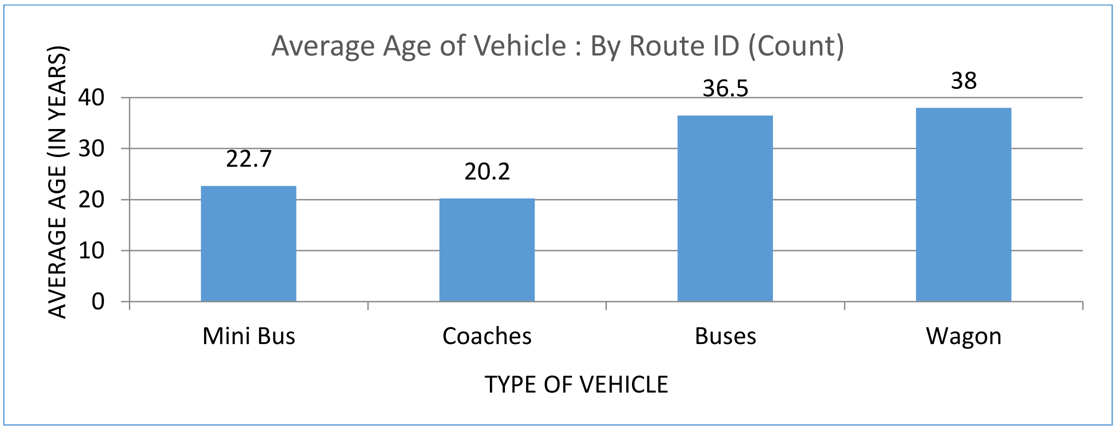
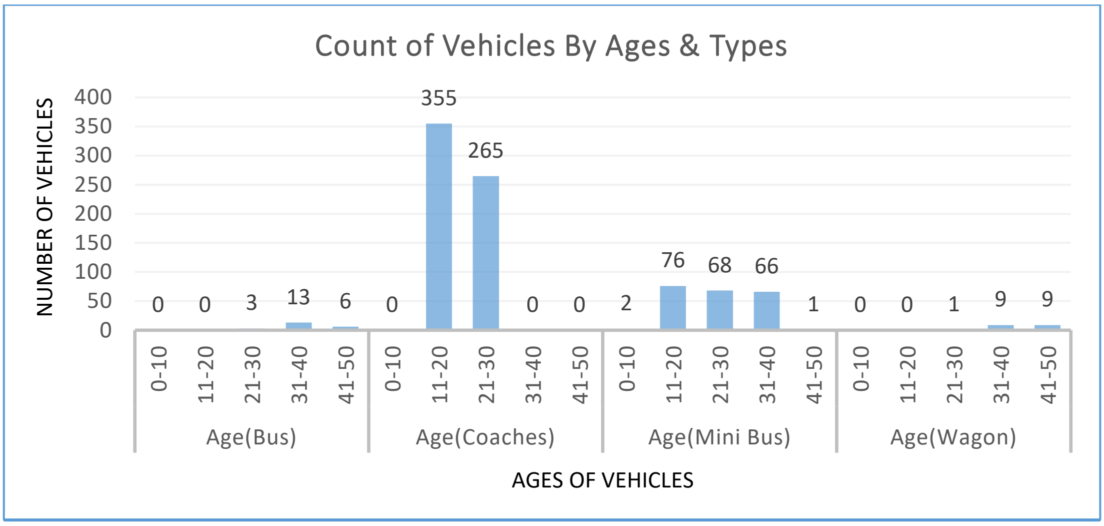


Figure 26: Average Age of Vehicles: By Route ID Count



The figure 27 shows the count of vehicles in different age brackets. Since the survey included only one large bus and one wagon route, the ratio of count per age bracket of these vehicles is lower than that of the coaches and mini buses.

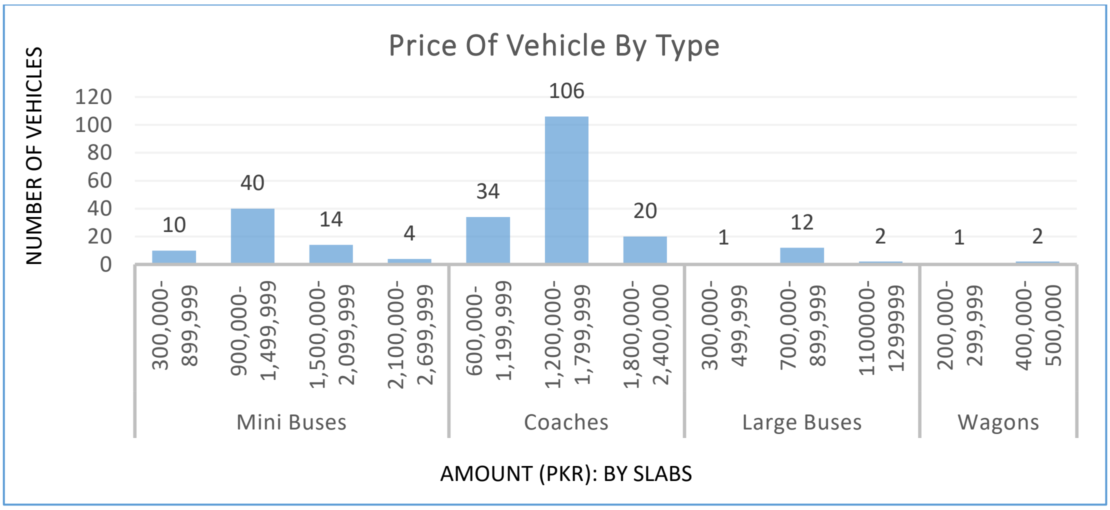
Figure 27: Ages of Vehicles by Type



3.1.6 Prices of Vehicles: By Type

The prices of these vehicle are also directly correlated to the ages of these vehicles. The figures below reveal the average price of the vehicles by classification. The prices of the coaches are very similar to those of the mini buses. The buses and the wagons, because of their ages, are the cheapest amongst the lot.

Figure 28: Average Price of Vehicle by Type



These vehicles have been purchased on both cash and lease terms. The survey results reveal that approximately 50% of Coaches and Mini buses are purchased on lease terms (figure 37). The average price by both cash and lease terms are shown in figure 29 & 30, respectively. As evident from the data shown in the figures, the cost of vehicle is higher on lease terms than it is on cash terms[7].

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[7] Since the number of wagons surveyed was quiet low, the survey results does not include any wagon that was purchased on lease terms.

Figure 29: Average Cash Price of Vehicles

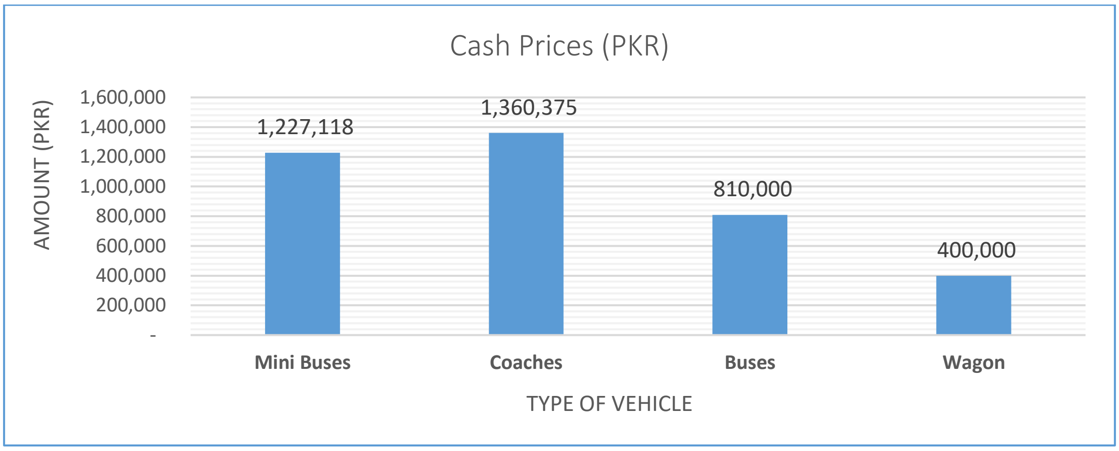
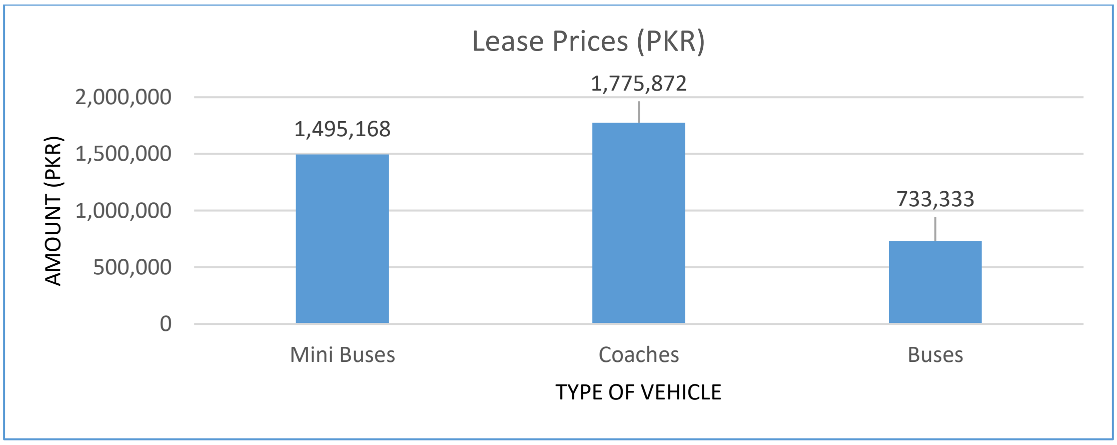


Figure 30: Average Lease Price of Vehicles



The details with respect to the down payment and monthly installment amount of the vehicles purchased on lease terms are shown in section 3.1.10 (figure 38).

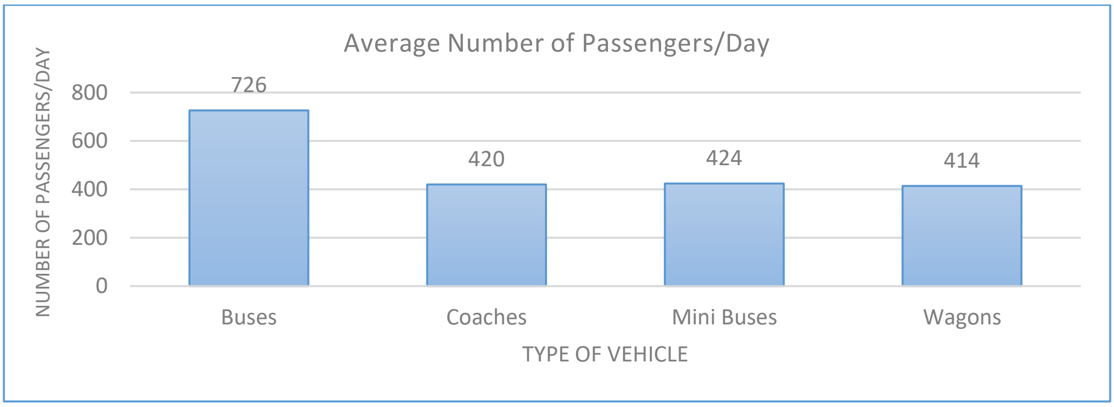
3.1.7 Passenger & Route Data Analysis:

The table 9 below provides a comprehensive picture of the industry's revenue model. The revenues of the vehicle are based on the number of round trips that it makes and the passengers it collects during that trip. The average length of the route indicate the spread of the passengers in the city. The reason why the average number of passengers for the large buses are higher than the rest, is because the large bus (11-C) is the only route, amongst the surveyed routes, that is allowed to enter the CBD area. The route is also significantly shorter than the average mini-bus and coach route.

Table 9: Bus Industry Profile

Vehicle Type	Avg. Route Distance in KMs	Avg. Round Trips/Day	Avg. Passenger/Vehicle/Round Trip	Passengers Travel/Day/Vehicle	Total Vehicles (Surveyed)
Buses	25	3	242	726	22
Coaches	48	2	210	420	490
Mini Buses	42	2	212	424	348
Toyota Wagons	20	3	138	414	19

Figure 31: Average Number of Passengers per Day: By Vehicle Type



3.1.8 Industry’s Working Hours

As evident from the figure 32, majority of the vehicles operate 7 days a week. Since Sundays offer the lower passenger volume, those who operate 6 days a week, prefer to hold their operations on Sundays.

More importantly, the average working hours are extremely high. As shown in figure 33, a significant number of vehicle operators work between 15 to 19 hours a day.

Figure 32: Percentage Distribution of Operational Days/Week

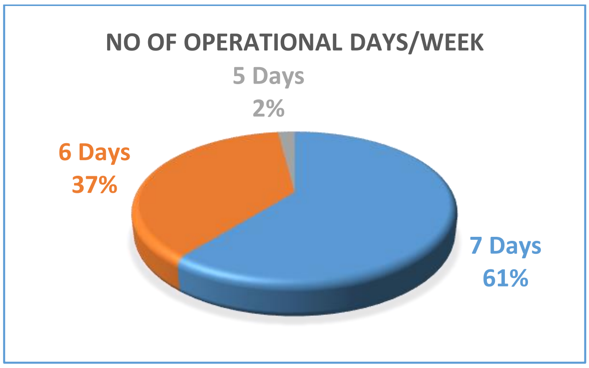
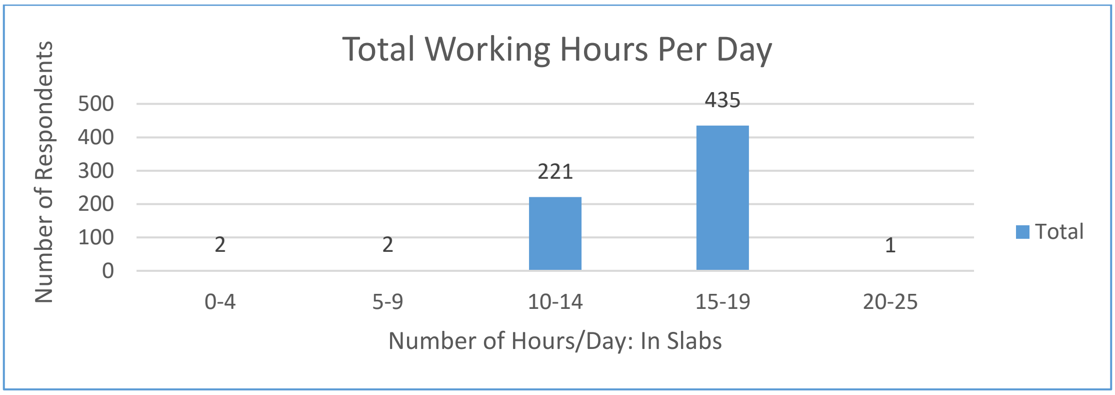


Table 10: The Off Working Days in the Week

Non-Working Day		
Off-Days	No. Of Buses	Percentage of Total
Sunday	273	33%
Saturday	4	0.5%

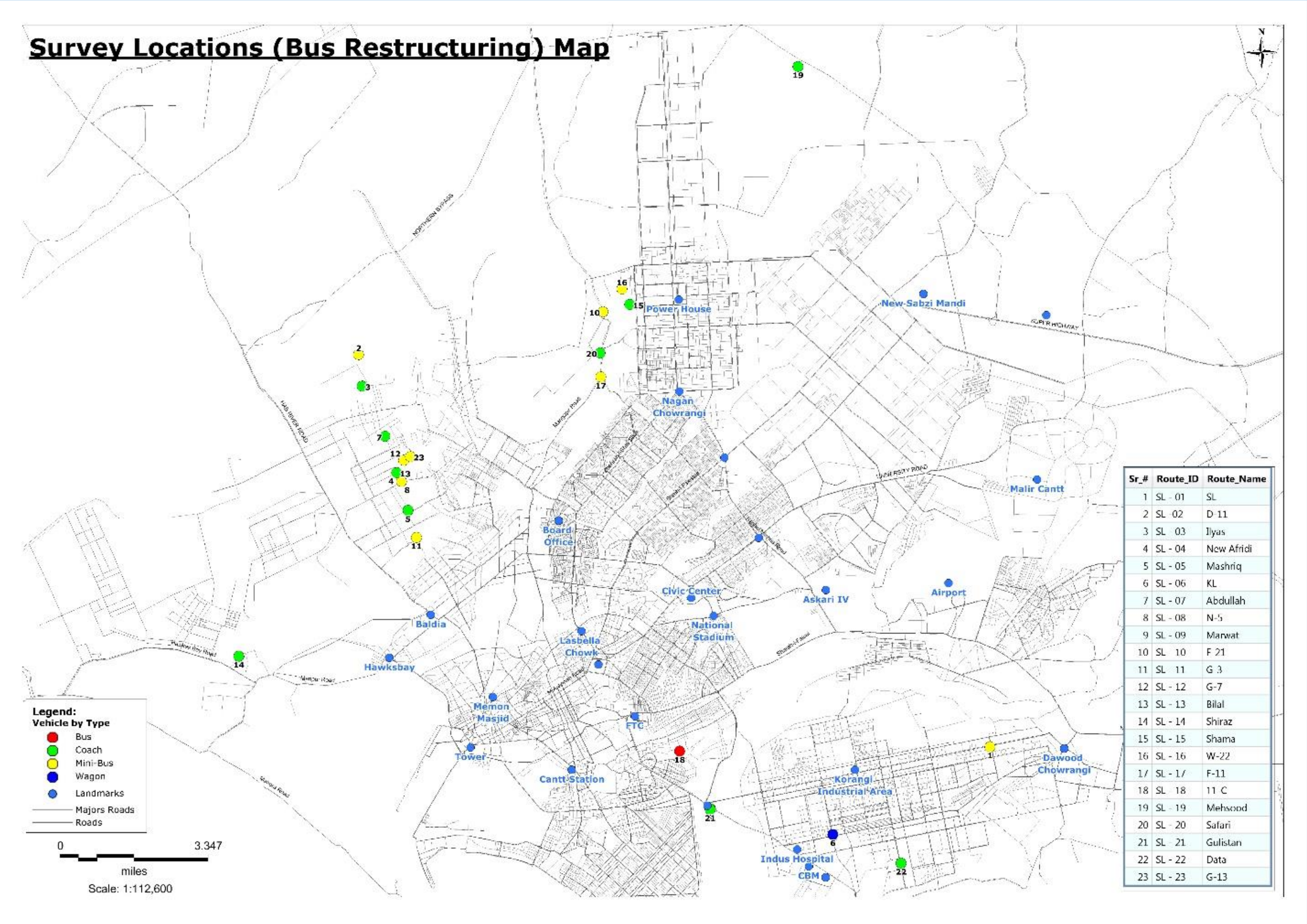
Figure 33: Working Hours per Day



3.1.9 Locations of the Terminals: Identifying the Clusters

As evident from map shown in figure 34, most of the terminals are located at the peripheries of the city. The distance and the conditions of the roads made the accessibility to these areas very difficult. The survey results reveal that the terminals of the routes form clusters with respect to their locations.

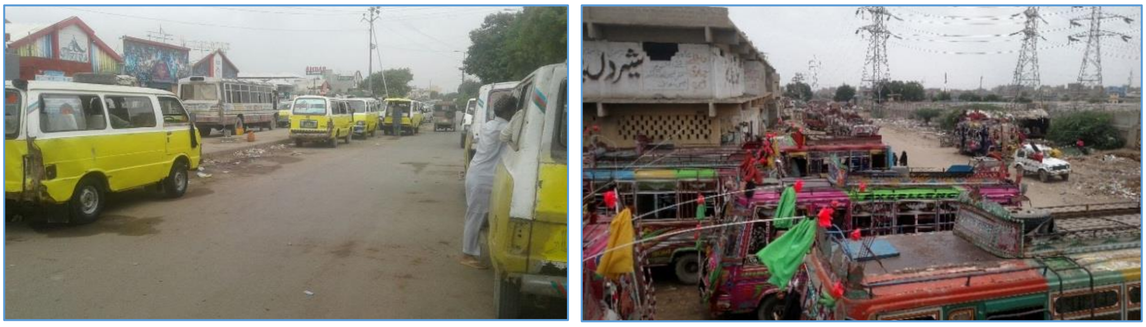
Figure 34: Survey Location Map (With Routes IDs)



Sr_#	Route_ID	Route_Name
1	SL - 01	SL
2	SL - 02	D-11
3	SL - 03	Ilyas
4	SL - 04	New Afridi
5	SL - 05	Mashriq
6	SL - 06	KL
7	SL - 07	Abdullah
8	SL - 08	N-5
9	SL - 09	Marwat
10	SL - 10	F-21
11	SL - 11	G-3
12	SL - 12	G-7
13	SL - 13	Bilal
14	SL - 14	Shiraz
15	SL - 15	Shama
16	SL - 16	W-22
17	SL - 17	F-11
18	SL - 18	11-C
19	SL - 19	Mehsood
20	SL - 20	Safari
21	SL - 21	Gulistan
22	SL - 22	Data
23	SL - 23	G-13

One of the reasons for locating the terminals at a distance from the city is to find large empty spaces that can accommodate the fleet of buses and to avoid charges for the using such spaces. Without any exception, all the public transport routes park the vehicles on the road sides. The figure 35 shows the pictures of the parking facilities at some of the terminals.

Figure 35: Pictures of the Locations of some Terminals (Addas')



K-L Adda (Korangi)

Bilal & New Afridi Adda (Ittehad Town)

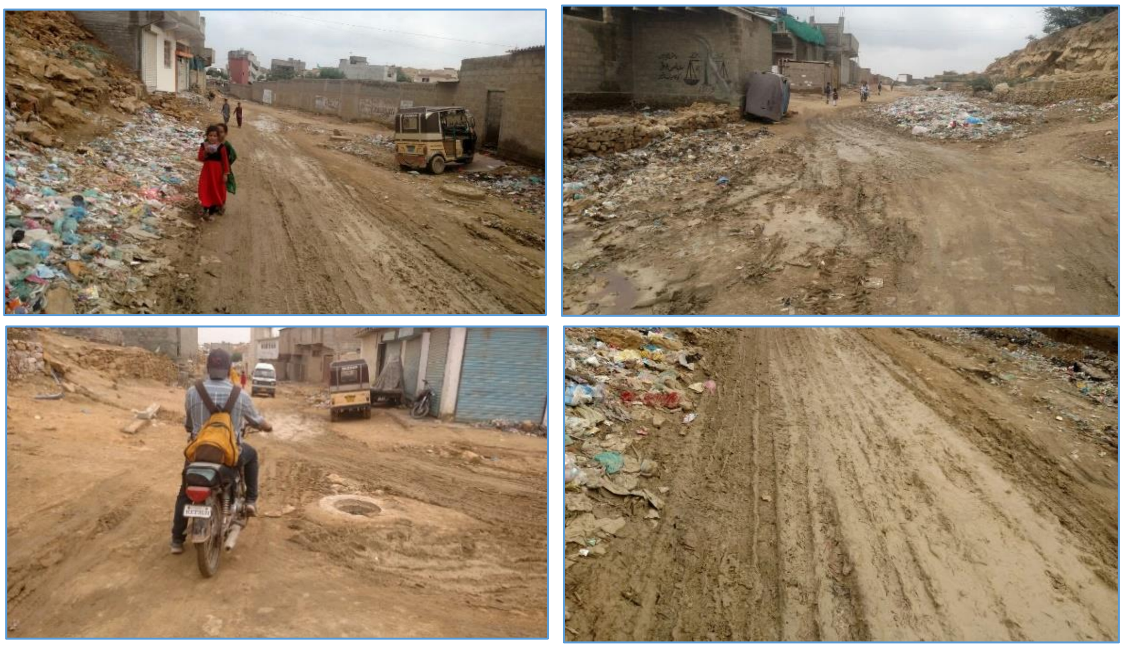
Marwat & Gulistan Adda (Qayyumabad)

F-21 Adda (Mangopir)

3.1.10 Revenues and Expenses of a Vehicle:

The owners of the vehicle were generally the ones complaining the most about the declining and deteriorating conditions of the public transport. The complaints were generally about the increasing maintenance expenses of the buses which were due to the worsening conditions of the road infrastructure. Figure 36 shows the conditions of the roads in Ittehad Town where majority of the terminals are located.

Figure 36: Pictures of Road Conditions in Ittehad Town



Other than the maintenance issues, most of the owners were also found complaining about the manipulation of money by the drivers and conductors. The details with respect to the payment mechanism has been discussed in the following section of the report. The table 13 shows the average earnings and expenses per day of a vehicle by classification.

3.1.10.1 Revenues from a Vehicle:

The revenue of a vehicle per day can be calculated by simply multiplying the below mentioned variables:

1. Number of trips per day
2. Number of passengers per trip
3. Average fare per passenger

The average daily revenues for the different modes are shown below in table 11.

Table 11: Average Daily Revenue from a Vehicle

Type of Mode	Avg. Daily Earnings (PKR)

Buses	7,660
Coaches	7,200
Mini Buses	7,070
Wagons	4,740

3.1.10.2 Expenses of a Vehicle:

The table 12 above shows the amount of expenses in different periodic scales. The amount mentioned against each of the expense head is an average value.

Table 12: Average Expense of a Vehicle

Vehicle Expenditures					
Expense Period	**Expense Head**	**Buses (PKR)**	**Mini-Buses (PKR)**	**Coaches (PKR)**	**Min Buses (Toyota Wagons) (PKR)**
Daily Expenses	Fuel	3,400	3,200	3,200	1,400
	Salaries (Driver, Conductor & Cleaner)	1,600	1,600	1,600	1,300
	Terminal and Route Charges	450	600	600	360
Monthly Expenses (Routine Maintenance)	Brake Oil & Setting	6,500	3,500	3,500	3,800
	Police Challan	4250	500	5000	1125
	Vehicle Service	2,500	1,500	1,500	650
	Tire Puncture	1,600	1,400	1,400	500
Yearly Expenses[8] (Periodic Maintenance)	Battery Change	15,000	15,000	15,000	10,000
	Tire Change	105,000	92,000	92,000	75,000
	Gear Set change	60,000	75,000	75,000	6,000
	Engine Overhaul	80,000	35,000	35,000	15,000
	Motor Tax and Route Permit Fee	6,000	6,000	6,000	3500

In order to develop a better understanding about the profitability from the different modes of transport, these expenses have been broken into daily expense amount.

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[8] The data for vehicle expenses, except those for the tire change, were collected as a lump sum amount under the head of routine and periodic maintenance in the form. Further division of expenses was done based on information gathered on calls that were made to the owners of vehicles.

The table 13 shows the daily revenue and expense figures for the different each vehicle type.

Even though the large buses show higher profitability per day, the case may not be the same for all the large bus routes. The survey included only one bus route i.e. 11-C and since it is one of those very few routes that are allowed to operate in the CBD area and the fact that the route is quiet shorter than any other surveyed routes, the profitability is higher than that of the coaches and mini buses.

Table 13: Vehicle's Earnings v/s Expenses Sheet

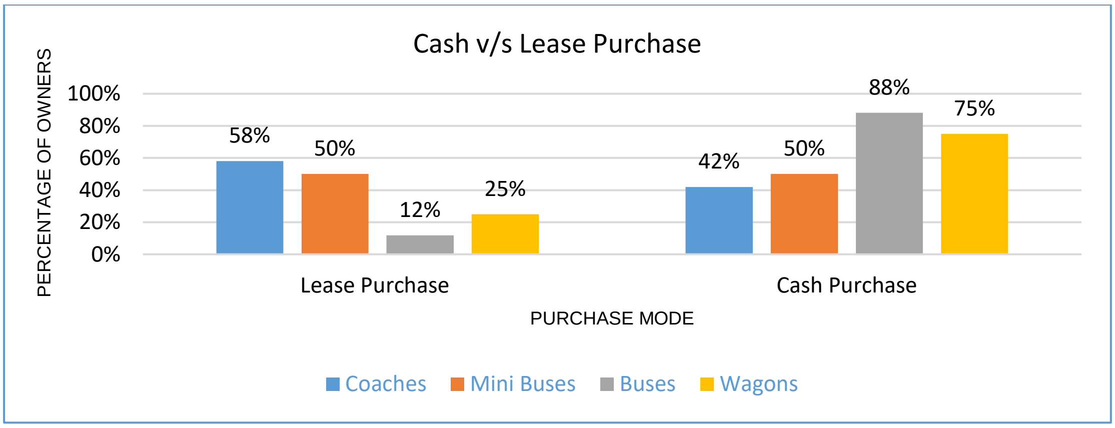
Type of Mode	Avg. Daily Earnings (PKR)	Avg. Daily Expenses (PKR)	Avg. Net Income/Day (PKR)
Buses	7,660	6,507	1,152
Coaches	7,200	6,214	986
Mini Buses	7,070	6,144	926
Wagons	4,740	3,525	1,215

The net income from the coaches and the mini buses seem relatively lower than that of the buses and wagons. These figures only validate the claims made by the owners of the vehicles. Most of the owners complained about the rising expenses and decreasing profitability in the sector. Technically speaking, the drivers and conductors seem better off than the owners by earning on an average Rs 700 per day.

However in order to cover the thin profitability, a large number of owners (27%) drive their own vehicles to the save the cost of hiring a driver. The other channel adopted for improving the net income is by owning multiple vehicles. The multiple ownership allows the economies of scale to work to a certain degree.

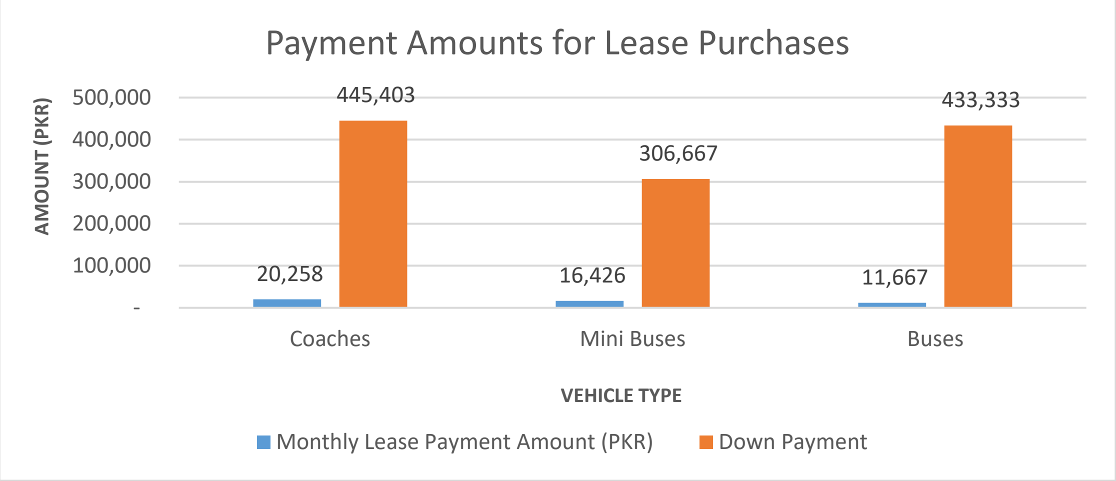
Other than the maintenance expenses, approximately 36% of the owners purchase their vehicles on lease agreements. The figure 37 below provides a comparison between the percentage of vehicle purchased on lease and cash terms.

Figure 37: Lease v/s Cash Purchases



The figure 38 reveals the average down payment and monthly lease amounts for the vehicles that had been purchased on lease terms.

Figure 38: Payments for Vehicle Purchased on Lease Terms

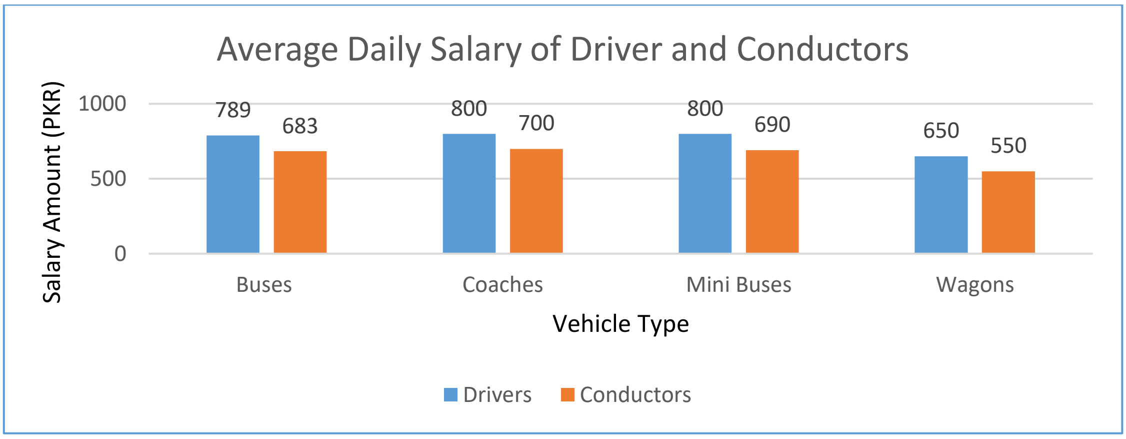


Considering the fact that approximately 50% of the vehicles (coaches and mini buses) are purchased on lease terms with an average monthly lease payment of Rs 20,000, the net monthly income of the owners puts a question mark on the sustenance model of bus operations.

3.1.10.3 Daily Wages & Payment Mechanism:

The drivers, conductors as well as the owners rely on a variable income that depends upon the net income of the day. The average salaries are shown in figure 39. The owners are handed over a net amount after deduction of all vehicle expenses. It is then up to the owners to pay the drivers and conductors an amount that reflects the net turnover of the day. There are hardly any cases of incentive or percentage based payment contract between the owners and the driver & conductors of the vehicles.

Figure 39: Average Salaries of Drivers and Conductors



3.2 Stakeholder's Profile Analysis:

3.2.1 Categorization of Identified Stakeholders:

There are multiple stakeholders associated with the public transport industry (Shown in figure 5). This report has focused on the first category of stakeholders' that are associated directly with the operations of the vehicle i.e. the owners, drivers and conductors. The next phase of this study shall include people associated with the route operations and ancillary businesses of the transport industry. The table 14 shows the number of owners, drivers and conductors interviewed/surveyed in this study.

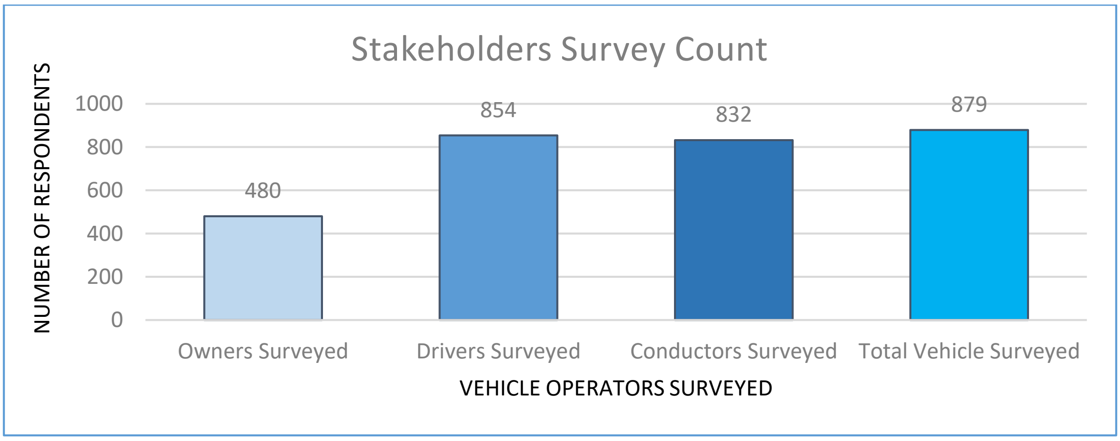
3.2.2 Survey Coverage:

All the drivers and conductors were contacted personally at the terminals and in their operative vehicles i.e. Coaches, Buses, Mini Buses and Wagons. Since the owners were mostly not available on the terminals, another round of survey was conducted to contact the owners on phone calls. Due to the personalized nature of the socio-economic information the confidentiality during the information collection process were kept intact.

Table 14: Number of Stakeholders Interviewed

Stakeholder	Buses	Coaches	Mini Buses	Wagons	Total	In Percentages
Owners	18	416	200	4	480	55%
Drivers	22	530	285	17	854	95%
Conductors	21	594	200	17	832	93%

Figure 40: Count of Total Stakeholders Interviewed in Field



3.2.2.1 Issues with Interviewing the Owners:

The reason why the number of owners interviewed is significantly lower than that of that of the drivers and conductors is due to the fact that the owners were not available on the terminals where the surveys were conducted. In order to interview the owners, a separate round of survey was conducted. In order to convince the owners to share the information, the surveyors had to engage the respective Munshi's of the Addas. The Munshi would first communicate the purpose of the survey to the owners on call and then hand over the cell phone to the surveyors for interview. The owners, in general, hesitated to share the information on call. Therefore a number of questions, particularly those that were related to family, were dropped from the questionnaire.

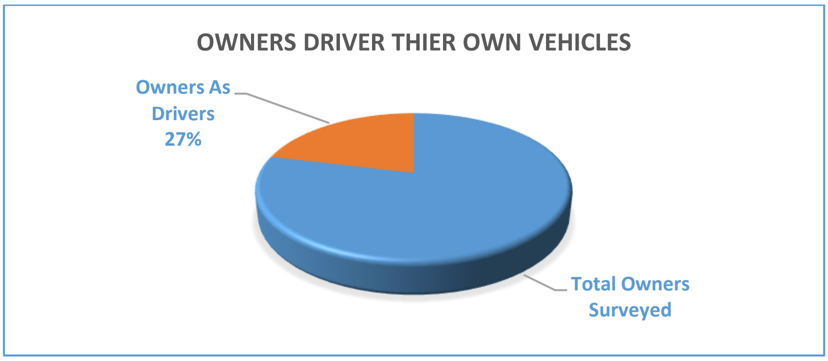
3.2.2.2 Owners Driving their Own Vehicles:

A large number of owners drove their own vehicles, primarily, for the purpose of saving the amount of salary for hiring a driver. In addition, most of the owners had a trust deficit with the drivers and conductor. The owners alleged that the drivers and conductors earn much more than what they share with them.

Table 15: Owners Driving Their Own Vehicles (In Percentages)

Stakeholder	Buses	Coaches	Mini Buses	Wagons	Total
Owners As Drivers	0%	25%	35%	50%	27%

Figure 41: Total Percentage of Owners as Drivers



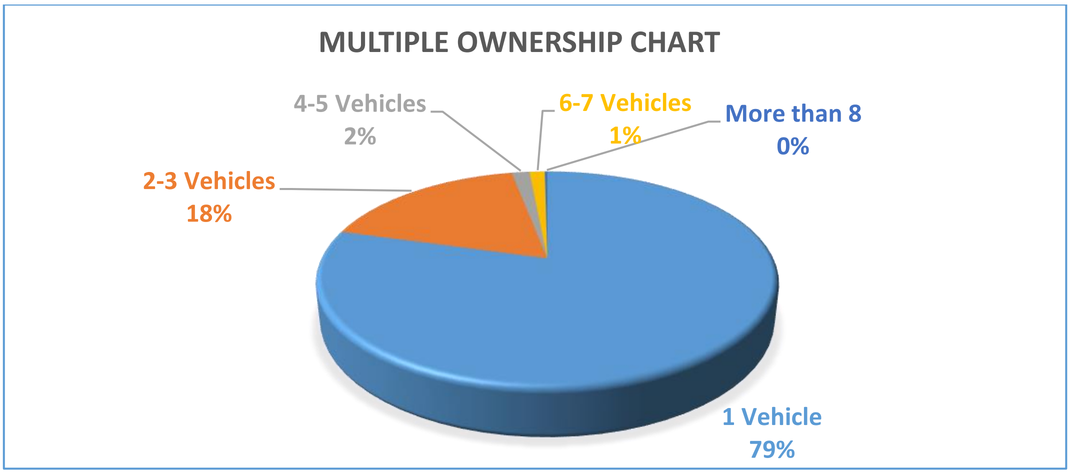
3.2.3 Vehicle Ownership Count:

The table and figure below demonstrate the vehicle ownership trend in the industry. The figures reveal that a significant number of owners (21%) own multiple vehicles. The multiple ownership allows the owners to substantiate the minimal profits earned by a single vehicle. The details with respect to the expenses and profitability of a vehicle are presented in section 3.1.10.

Table 16: Vehicle Ownership Trend

Ownership Quantity	No of Owners
1 Vehicle	369
2-3 Vehicles	82
4-5 Vehicles	7
6-7 Vehicles	6
More than 8	1

Figure 42: Multiple Ownership Chart



3.2.4 Stakeholder's Personal Profile

3.2.4.1 Average Age of the Vehicle Operators:

The figure 43 and 44 show the average age of the stakeholders. The data shows a natural decline in ages of the stakeholders moving from the owners to conductors. The job of a conductor requires lot of energy, therefore young men are more suitable for this job. The role of a conductor is also used to train the new entrants in the sector.

Figure 43: Average Age of the Stakeholders

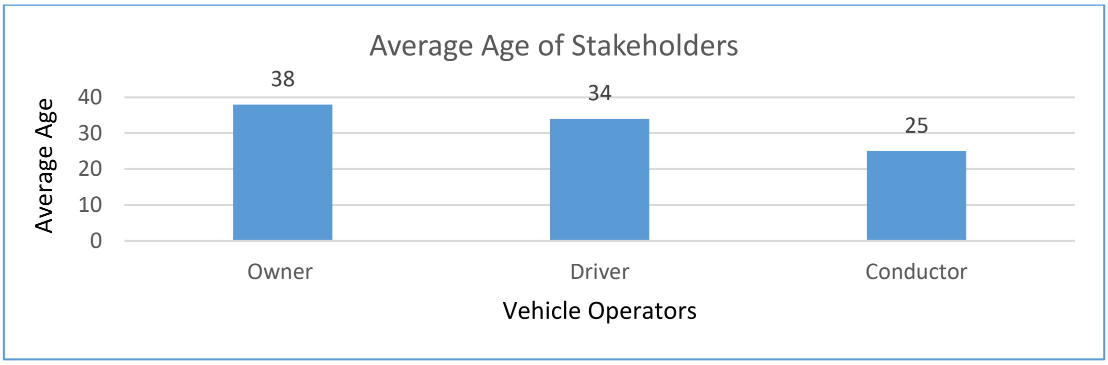
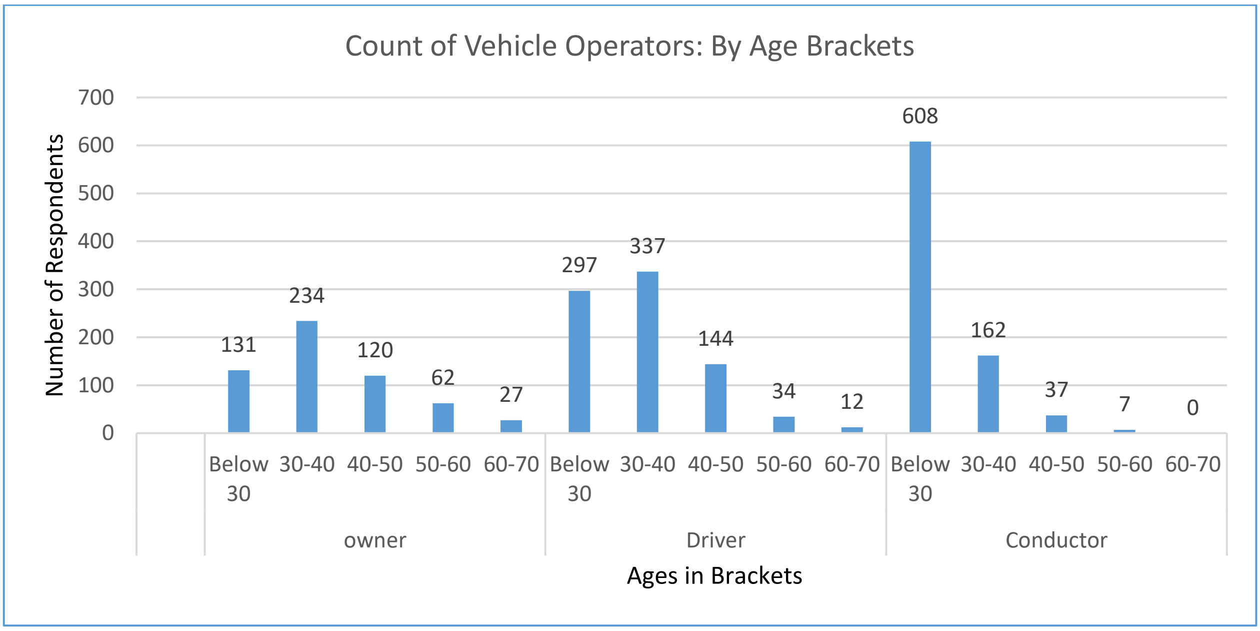


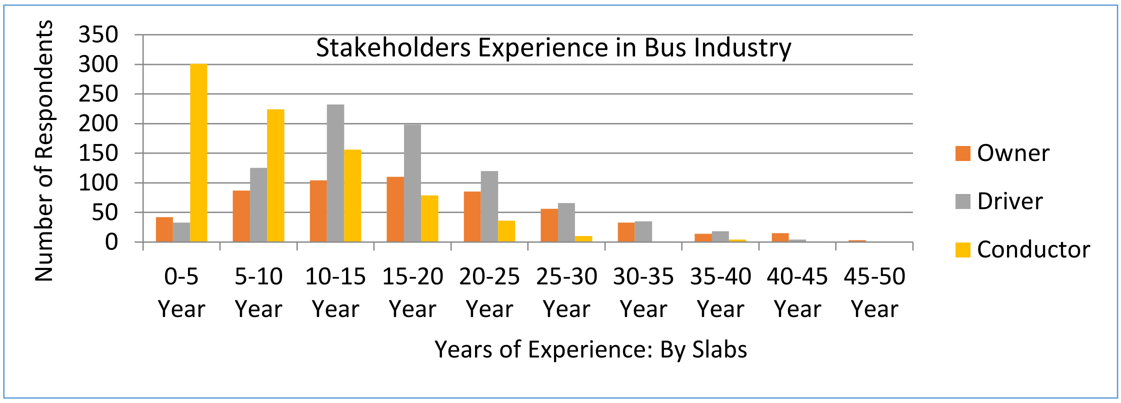
Figure 44: Count of Vehicle Operators: By Age Brackets



3.2.4.2 Experience of Vehicle Operators:

The figure 45, which shows the experience of the vehicle operators, is a reflection of the ages of these stakeholders. It is quite evident from the trend that the largest segment of the drivers and owners have been working in the industry for a period of over 10 years.

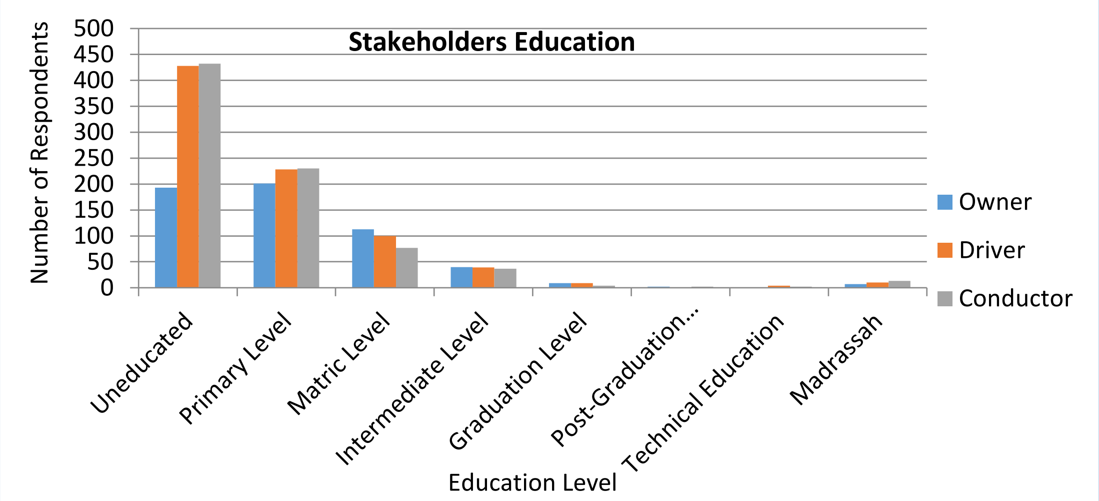
Figure 45: Distribution of Count: By Industry Experience



3.2.4.3 Educational Level of Vehicle Operators:

Since the most of stakeholders are introduced in the sector at an early age, majority do not get a chance to enroll in the schools. Very few, mostly the owners, make it to the secondary and higher secondary levels. It is however been noticed that the owners prefer their children to enroll in higher education due to the fact that the industry is getting less profitable with the passage of time.

Figure 46: Education Level of Stakeholders



3.2.4.4 Residential Status of Vehicle Operators:

As evident from the figure 47, the residential status differs between the vehicle operators. Contrary to the residential statuses of the drivers and conductors, the majority of the owners live in houses that they own. This also reflects the financial status of the stakeholders. The figure 48 shows the average amount of rent being paid by the stakeholders.

Figure 47: Residential Status of Stakeholders

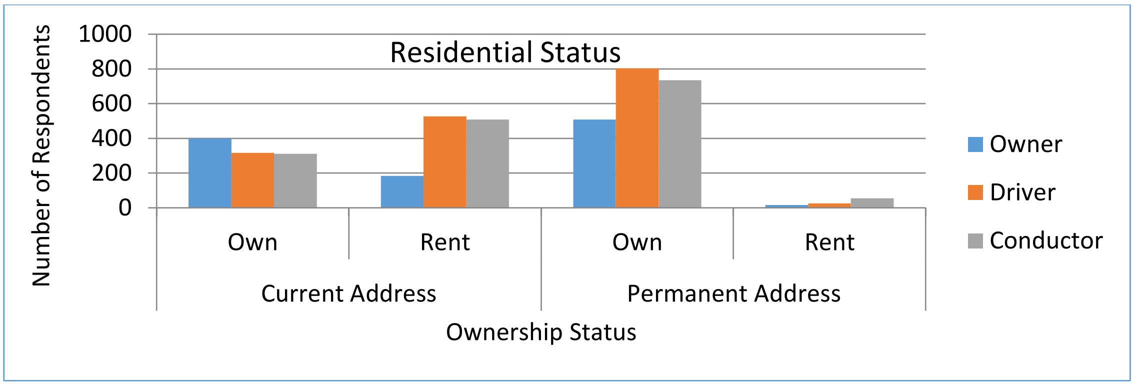
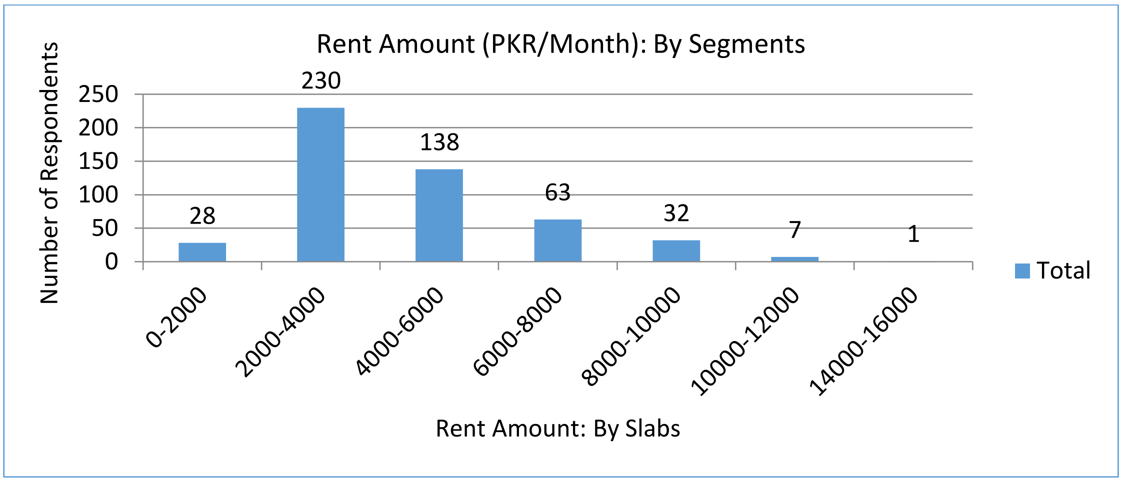


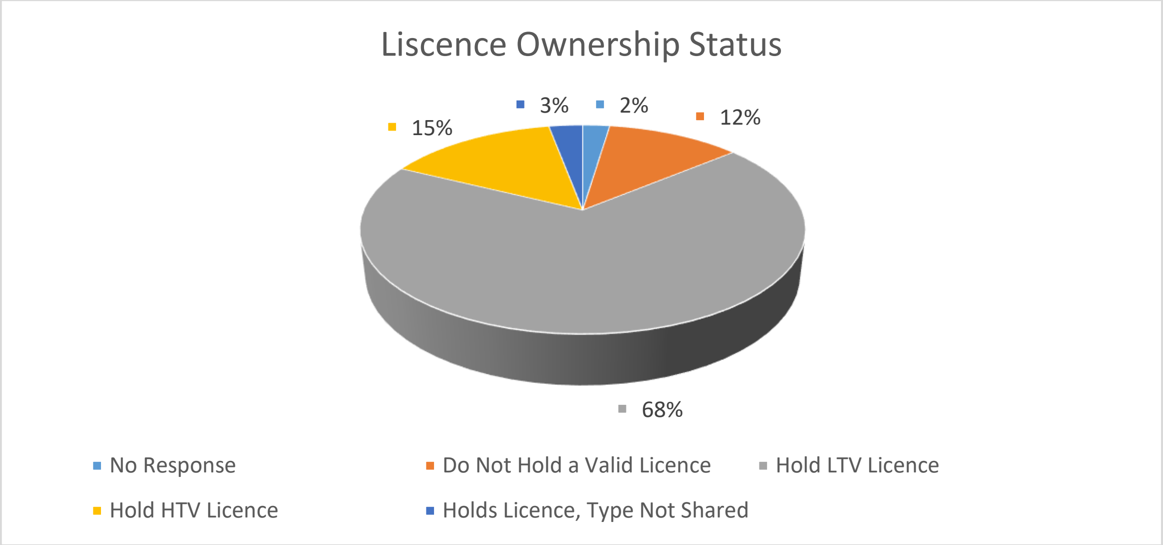
Figure 48: Amount of Rent: By Segments



3.2.4.5 Driver's License Status of Vehicle Operators:

The pie chart below demonstrates the percentage distribution of driver's license ownership status. Majority of the drivers held Light Transport Vehicle (LTV) license which is relatively easier and less expensive to obtain than a Heavy Transport Vehicles (HTV) License. 12% of the vehicle operators do not even have a legal Driver's License. Such violations allow the traffic police personals to penalize the vehicle operators on frequent basis.

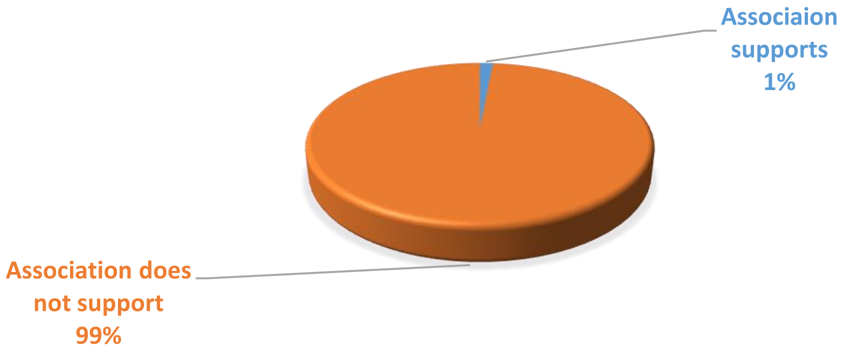
Figure 49: License Ownership Status



3.2.4.6 Vehicle Operator's Views about Transport Associations:

The figures clearly reveal that the stakeholder do not hold a very positive view about the support they get from the associations. There is primarily one key association i.e. Karachi Transport Ittehad (KTI), that represents the industry's stakeholders. The association such as the Karachi Bus Owners Association (KBOA) works under the umbrella of KTI.

Figure 50: Vehicle Operators Opinion about Transport Associations

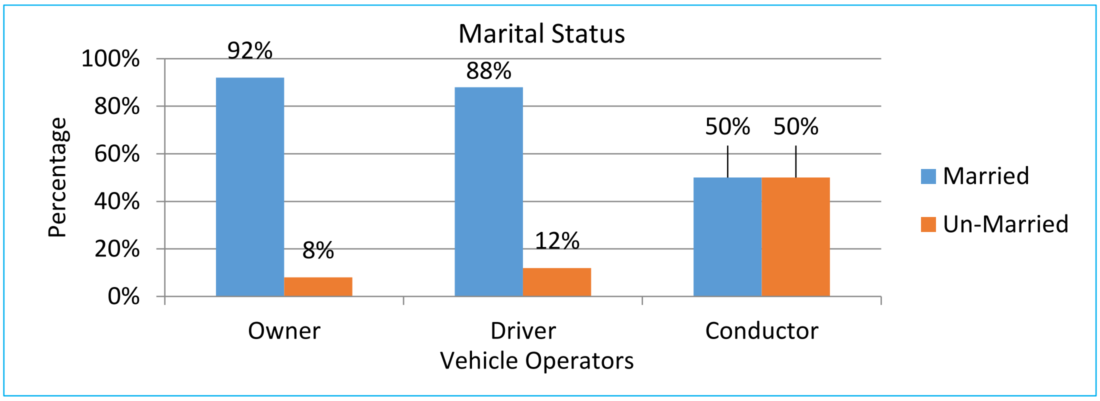


3.2.5 Stakeholder’s Family Profile

3.2.5.1 Vehicle Operator’s Marital Status:

The surveys evidently disclosed that most of the stakeholders are married and supporting multiple children. While comparing the figures, the ratio between married and unmarried participants for the conductors seem significantly different from those of the other stakeholders. It is also evident from the figure 43 (Age of Vehicle Operators) that the conductors are generally young men, who begin their career in the sector by working as conductors.

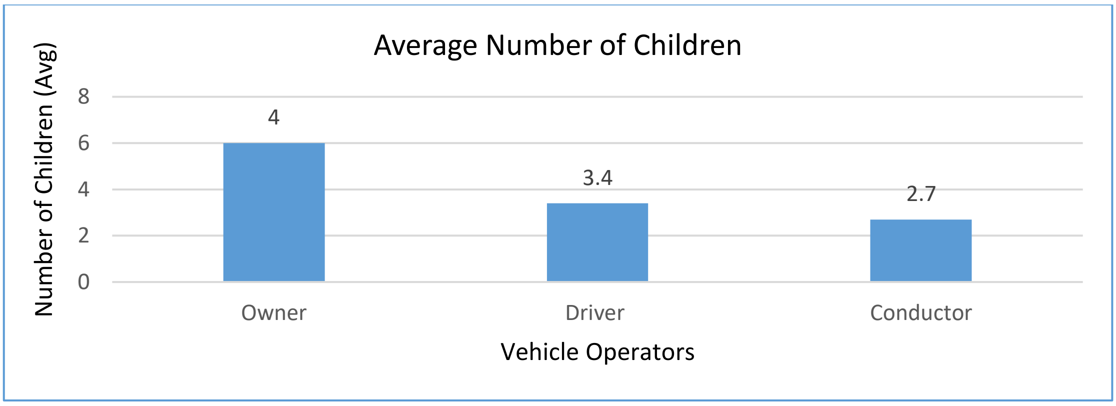
Figure 51: Martial Status of Stakeholders



3.2.5.2 Vehicle Operator's Children Profile:

As illustrated in figure 52, the average number of children varies slightly between the stakeholders, with the owners having 4 children on an average compared to 3.4 for the drivers and 2.7 for the conductors. The explanation for this difference may be best found with the average ages and the financial status of the stakeholders.

Figure 52: Average Number of Children: By Stakeholders



As evident from the graph, most of the stakeholders on an average have between 3 to 5 children each, with most of children under the age of 12 (figure 53). This average matches the national fertility rate of 3.5 children per woman.

Figure 53: Number of Children: By Segmentation

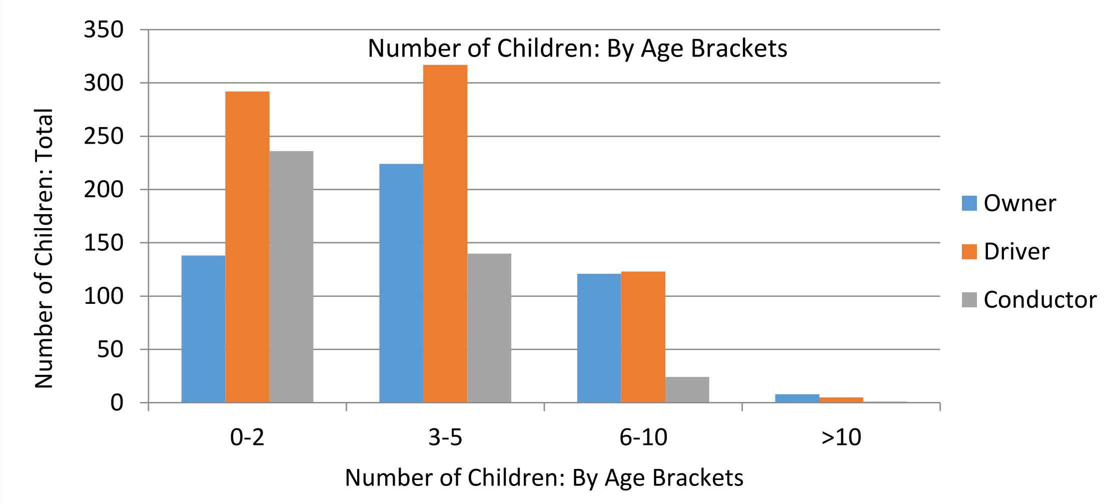
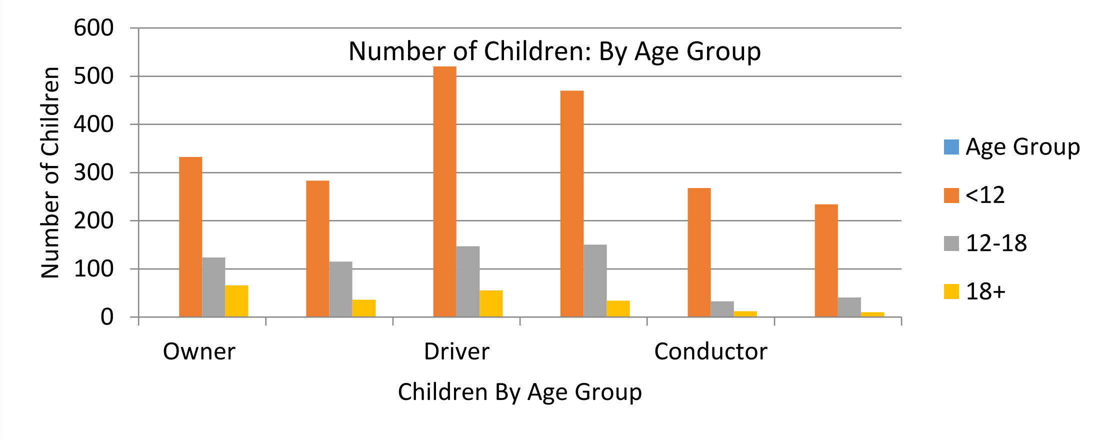
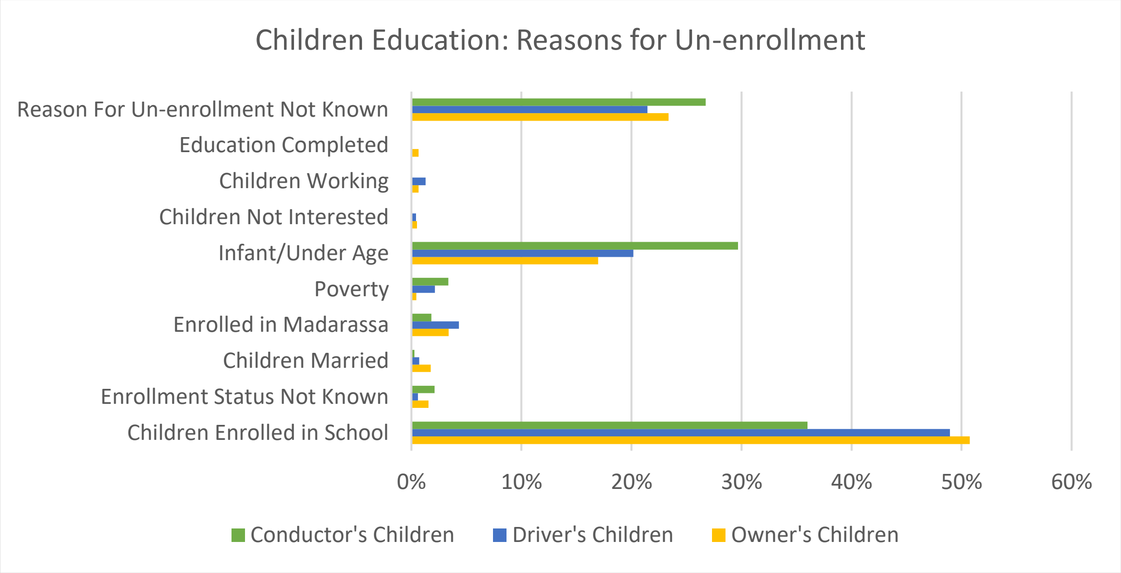


Figure 54: Number of Children: By Age Group



The figure 55 shows the enrollment status of stakeholder's children in an education institute. The survey results revealed that even though most of the stakeholders had their children enrolled in schools, very few had their children enrolled for higher education. The most of the cases it was the owners of the vehicle who has their children enrolled in a higher education institutes and did not want their children to get involved in the public transport sector.

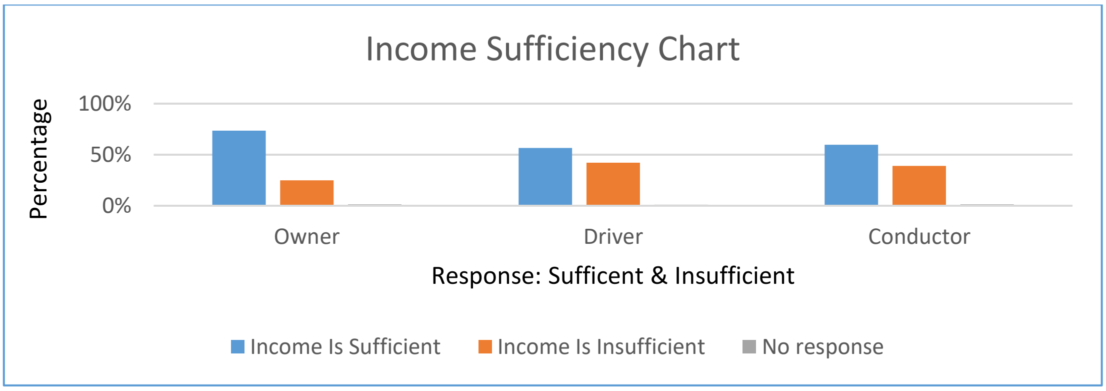
Figure 55: Reasons for Not-Enrolling in Schools



3.2.6 Stakeholder's Economic Profile:

The financial conditions of the owners, drivers and conductors can be assessed by taking into account their sources of income and the expenses. However, since the average income and expenses may not present an accurate assessment in every case, the vehicle operators were also asked a question about their income sufficiency.

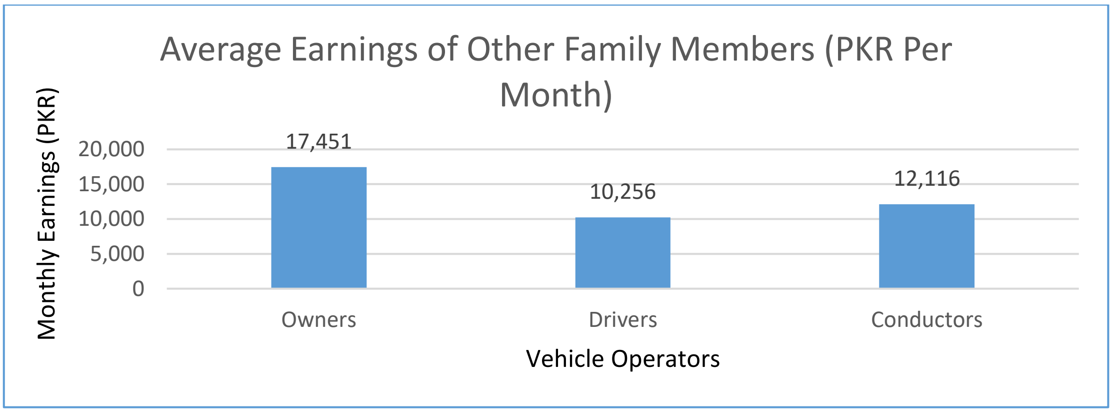
Figure 56: Income Sufficient Chart



Those who found their income insufficient, either somehow managed by cutting their expenses or by taking loans & investing in committees[9] (money pooling system). The table 18 shows the percentage of vehicle operators who held financial liabilities in shape of loans and committees.

Since a large majority of the Pashtun community live in a combined family setup, the average income of other family members (Spouses, parents & siblings), may also help in assessing their livelihood sustainability model. Figure 57 shows the average income of the other family members.

Figure 57: Average Earnings of Family Members (PKR/Month)



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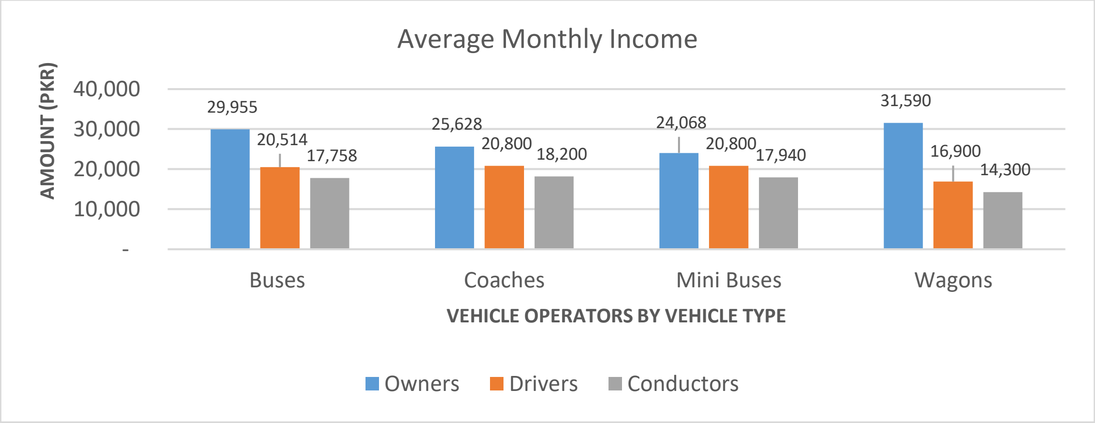
[9] It is money pooling system that is structures in such a way that a group of people contribute an equal amount of money every month, allowing each member to take turns on drawing the accumulated sum of money each month for a period which equal the number of participants.

3.2.6.1 Household Revenues:

The revenues of the vehicle operators are quiet simple to assess. In almost all the cases, the vehicle operators had a single source of income i.e. the public transport sector. The average daily revenues from a vehicle are already shown in table 11. In the case of drivers and conductors, the average incomes from the vehicle are shown in figure 37. The average daily income of the owners has been multiplied by 26 working days to determine their average monthly income. Even though most of the vehicle operate 7 days a week, the reason for selecting 26 days is to leave a provision for vehicles off route time for repair and maintenance. Table 13 (Section 3.1.10) shows the average monthly income and expenses of the vehicle operators.

Figure 58: Average Monthly Net Income from a Vehicle



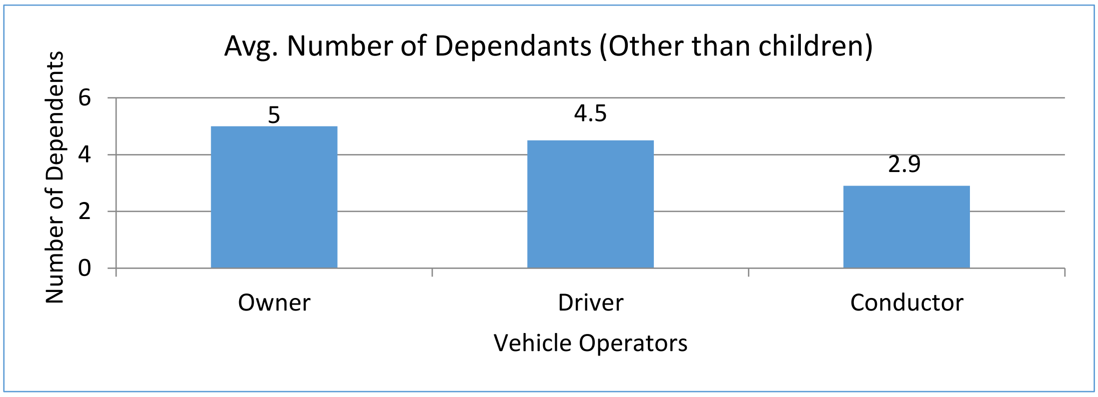
Since the vehicle owners have to bear all the routine and periodic maintenance expenses of the vehicle, a fair assessment of his/her financial condition is not possible unless the vehicle related expenses are also accounted for in the list of general household expenses explained below in section 3.2.6.2. Therefore the owner's income has been calculated after removing all the periodic and routine expenses incurred with the vehicle.

As evident from the chart, the owners of the coaches and mini-buses earn on an average Rs 26,000 per month. As explained in section 3.1.10 of the report, in order to sustain a decent livelihood, a large number of owners either drive their own vehicle (27%) or own multiple vehicles to achieve certain level of economies of scale.

3.2.6.2 *Household Expenses:*

The household expenses of a vehicle operator are based on the number of dependents on his/her earnings. The figure 59 shows the average number of dependents, which family members other than the children, of the vehicle operators.

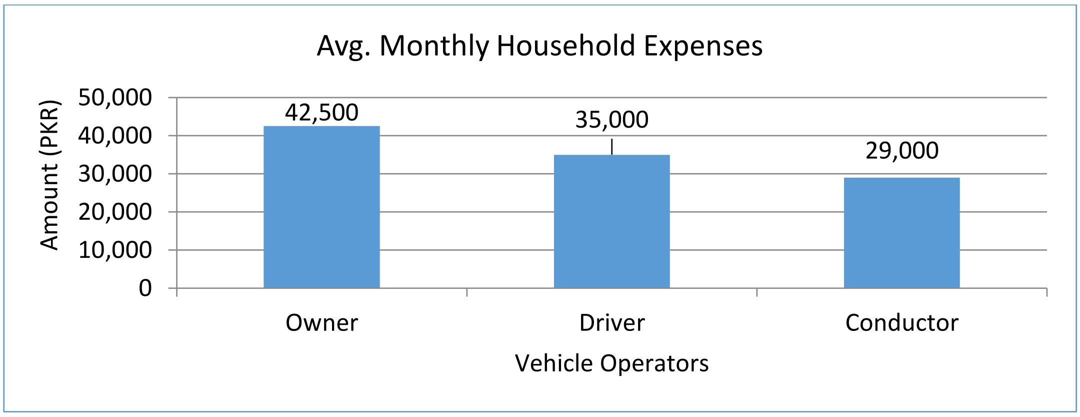
Figure 59: Average No of Dependents (Other than Children)



The vehicle operators on an average have between 3 to 4 children each. Adding this number to the average number of dependents presents a better picture of the operator's household expenses shown in figure 60. The average monthly expenses were determined under the following heads:

1. Rent
2. Utilities
3. Food
4. Education
5. Medical
6. Transport
7. Miscellaneous

Figure 60: Average Monthly Household Expenses



3.2.6.3 Assets Ownership Status

In order to determine the financial strength of the vehicle operators, it was important to find out the fixed assets these operators owned. The assets have categorized into the following types:

1. Houses (other than the one he/she resides in)
2. Land
3. Others

The table 17 and figure 61 show that an overwhelming majority of the vehicle operators does not own any large fixed asset.

Table 17: Assets Ownership Status of Vehicle Operators

Amount (PKR)	Owners		Drivers		Conductors	
	In Numbers	In Percentages	In Numbers	In Percentages	In Numbers	In Percentages
No Assets Owned	537	97%	816	98%	791	99%
Up to 1,000,000	13	2.3%	12	1.4%	17	2%
1,000,001-3,000,000	3	0.5%	1	0.1%	2	0.2%
3,000,001-5,000,000	2	0.4%	0	0.0%	0	0.0%
5,000,001-6,000,000	1	0.2%	0	0.0%	0	0.0%
>6,000,000	2	0.4%	1	0.1%	0	0.0%

Figure 61: Vehicle Operators Assets (House, Land etc.) Ownership Status

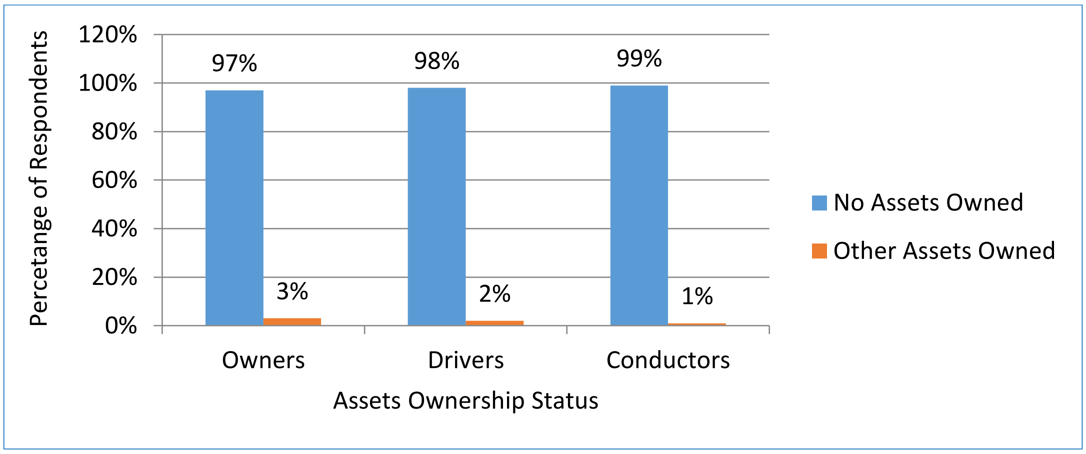
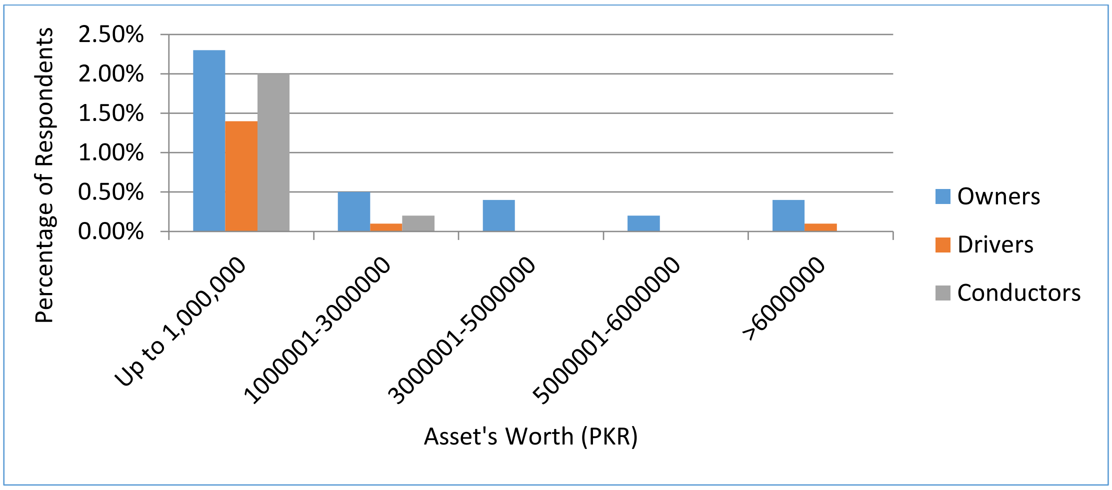


Figure 62: Percentage Distribution of Assets Ownership: By Asset's worth



1.2.6.4 Liabilities Status of Vehicle Operators

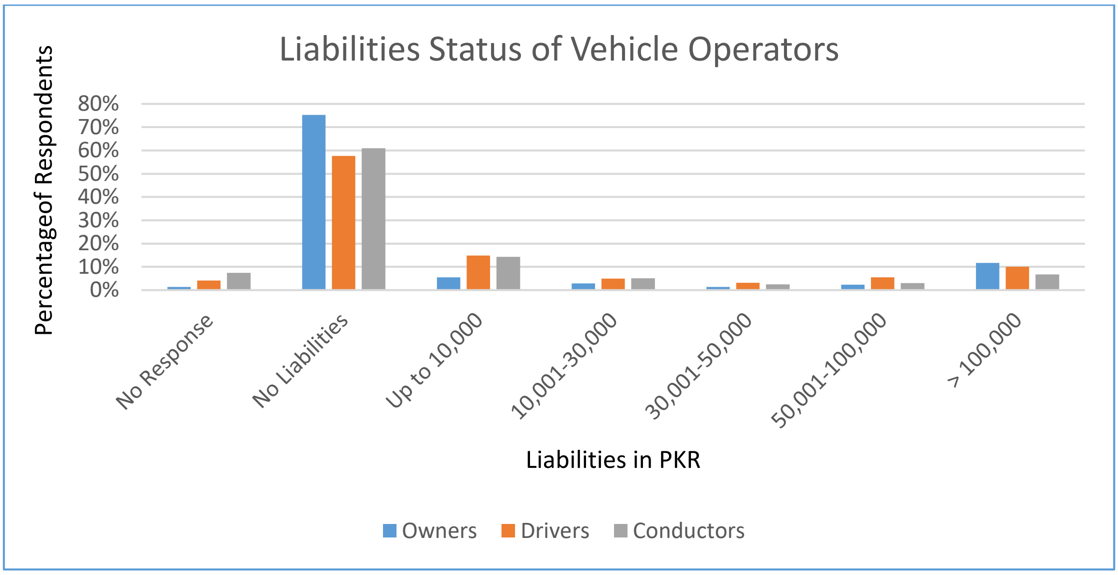
The income and expense analysis indicate a significant deficit in the earning to expense ratio of the vehicle operators. The analysis of the liabilities, shown in table 18, reveal that a significant percentage of the vehicle operators rely on financial assistance in shape of loans and committees (money pooling system), to cover their expenses. The Liabilities have been placed in the following heads:

1. Financial Loans
2. Committees (Money Pooling System)
3. Others

Table 18: Liabilities Status of Vehicle Operators

Amount (PKR)	Owners		Drivers		Conductors	
	In Numbers	In Percentages	In Numbers	In Percentages	In Numbers	In Percentages
No Response	8	1%	34	4%	60	7%
No Liabilities	423	75%	478	57.6%	495	61.0%
Up to 10,000	31	6%	123	15%	116	14%
10,001-30,000	16	3%	41	5%	41	5%
30,001-50,000	8	1%	26	3%	20	2%
50,001-100,000	13	2%	45	5%	25	3%
> 100,000	66	12%	83	10%	55	7%

Figure 63: Financial Liabilities of Vehicle Operators



3.3 Summary:

As discussed in the introduction of the report, the objective of the study was to gain an in insight into the operational mechanism of the public transport industry. The purpose of developing such an understanding was to prepare grounds for the process of engaging key stakeholder from the industry in the BRTS development plan.

The analysis of the data that had been collected from the field provides a picture of the operational mechanisms adopted by the industry and the socio economic conditions of the industry's players. The data strongly suggests that the industry is not operating on thick profitability. In fact, the industry has been in a state of constant decline for the last decade.

The results from the study should provide the necessary basic framework to the planners for developing the unprecedented restructuring program for the industry.

ANNEXURE 1: SURVEY FORM

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.2 & 5.2 - RED & YELLOW LINE – ECONOMIC COMPENSATION AND FLEET SCRAPPING PROGRAM

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

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1. Introduction

The success of a mass transit system, such as a Bus Rapid Transit Service, is dependent heavily upon the ridership of the service. The potential riders of the service are more likely to be those people who are currently using one of the existing modes of public transport in the city.

While it is critical to encourage the people to shift their mode of transportation, it is equally important to ensure a smooth transition of the industry to modern transportation systems. Therefore it is important to include the stakeholders of the existing industry in the transformation process and accommodate/compensate them for the loss of their business that may occur due to the introduction of the BRT service. The purpose of including these key stakeholders is to avoid conflicts, protests/demonstrations and litigation matters which could delay and even jeopardize the implementation of the entire project. The key stakeholders of the existing transport industry have been identified as follows:

- Vehicle Drivers & Conductors
- Vehicle Owners
- Route Management Team

The initial phase of this industry restructuring project included interviews and informal focus group discussion which were designed to develop a socio economic profile (BIRP Survey) of the participants and to determine the key issues that they face working in the industry. The second phase would require communicating the BRT related information with the participants and sharing an outline of the compensation plan with them.

1.1 The Key Stakeholders: An Overview

1.1.1 Vehicle Drivers & Conductors

Since the drivers and conductors are employed by the owners of the vehicles, therefore the best way to compensate them is by offering these people jobs in the BRT system. The jobs may include that of a driver, conductor and other supporting services. The details regarding their compensation plan is explain in section 4 of the report.

1.1.2 Vehicle Owners

The result of the BIRP survey revealed that since the owners of vehicles provide the essential financial capital to sector they form the backbone of this industry. A sustainable livelihood of the owner is therefore critical to sustain the livelihood of all other connected stakeholders of the industry.

The compensation plan for the owners of the vehicle offers the owners to sell their vehicles to the government on a price that shall be compatible with the market value and also take a one year compensation money which shall be equivalent to the amount they save as profits from the operations of their vehicle.

The survey data revealed that a vehicle owner on an average saves approximately Rs 25,000 to 28,000 per month as profit from a single vehicle. Therefore the one year business loss compensation amount is set at Rs 30,000 per month. This adds up to Rs 360,000 for a period of 1 year.

The amount to be offered for the purchase of a vehicle is based on the information gathered from the interviews of the owners followed by a survey of the prices from the open market. The budget for buying of the vehicles from the owners is based on the assumption that all the owners will be interested in selling their vehicle. A benchmark price has been set for each vehicle category based a methodology which explained later in the report. This method allows to set a price that also covers the influence of lease amount. Other than the setting the benchmark value for a vehicle, a detailed price evaluation criteria has been developed that shall assess the value of every vehicle that shall enter the scrapping program. The detail regarding the mechanism of vehicle assessment is explained in the section 3.3.2 of this report.

1.1.3 Route Management Team

The route management team is the most important player of the existing transport industry. This team does all the work that is needed to operate a route. This includes investing in setting up a route, managing its operations, managing the terminals, paying for the utility services, dealing with the law enforcement agencies and the Regional Transport Authority (RTA).

The route management team includes the owner of a route, the Munshis (Terminal Managers) who are stationed at each of the terminals and time keepers who are placed on the route. Generally each route is owned by multiple owners working as co-partners. Each route has at least two Munshis, with some routes having up to four Munshis who perform duties on alternate days. There are on an average around three time keepers placed on each route.

Even though the route management team may not be an officially recognized entity, it does hold a strong customary right to be compensated for the large financial and physical capital that it had invested to establish and operate the route over the years. In return for its services, the route management team charges each vehicle an adda and a token fee, which adds up to approximately Rs 600 per day.

More importantly, most of the route owners are also part of the transport associations and therefore have the potential to create hurdles in the industry restructuring plan. Keeping the above mentioned scenario in consideration, the route management team is recommended to be compensated for the loss of their business for a period of two years. The survey data shows that route management team saves Rs 150,000 per year from each vehicle that operates on their route. This amount adds up to Rs 300,000 for a period of two years.

The above mentioned explanations and rationales have been used as the basis to develop the compensation budget amount. The detail regarding the mechanism of vehicle assessment is explained in the section 5 of this report.

2 Routes Affected By BRTS

The compensation program shall include only those stakeholders/operators that are affected by the operations of the Red Line BRTS Services. The mechanism of identifying such stakeholders focuses primarily on analyzing the impact on the Origin Destination pairs of the existing operations. So therefore each case has been analyzed independently. The affected routes have been categorized as follows:

1. Routes to be closed

2. Routes to be curtailed

3. Routes to be slightly re-aligned

Each of these categories represent the degree to which the route affects the ridership of the BRTS or vice versa.

2.1 Routes to be Closed

The table 1 below shows the list of public transport routes that have been planned for closure after the operations of the Red Line BRTS. The primary reason for closure of these routes is the overlap with the BRTS. However, other than the element of overlap, the analysis of the origin and destination of each route with respect to that of the BRTS has also been considered in each case.

Table 1: Routes to be Closed

ROUTES TO BE CLOSED					
S. No.	**Route Name**	**Amendment Plan Revised**	**Route Length**	**Origin**	**Destination**
1	11 C	Closed	25.9	Saadi Town	Azam Basti
2	52 A	Closed	36.5	Landhi Industrial Area	Karachi ship yard

ROUTES TO BE CLOSED					
S. No.	**Route Name**	**Amendment Plan Revised**	**Route Length**	**Origin**	**Destination**
3	53 B	Closed	41.2	Konkar	Lee Market
4	55 B	Closed	37.4	Memon Goth & Gadap Link Road	Lee Market
5	F 1	Closed	18	Khokhrapar No 3	Chakhragoth Bus Stop
6	G 25	Closed	26.3	Mosamayat	Rasheedabad
7	G 3	Closed	34.3	19D (Graveyard)	Maroora Goth
8	G 7	Closed	38.7	Suparco Rd Bus Stop	Gulshan-e-Ghazi
9	Gulistan Coach	Closed	38.8	Pehelwan Goth Rd	Qayyumabad
10	KL	Closed	19.8	National Coach Last Stop	Nasir Jump Bus Stop
11	Marwat Coach	Closed	52.8	Qayyumabad	Budhni Goth
12	S 6	Closed	27.8	Khokhrapar C Area	Fazal e Elahi General Hospital
13	Sheraz Coach	Closed	38	Malir 6 no	Near Musharraf Colony/Hawksbay
14	Starline Coach	Closed	40.6	N25	Khatm-e-Nabuwat Chowk

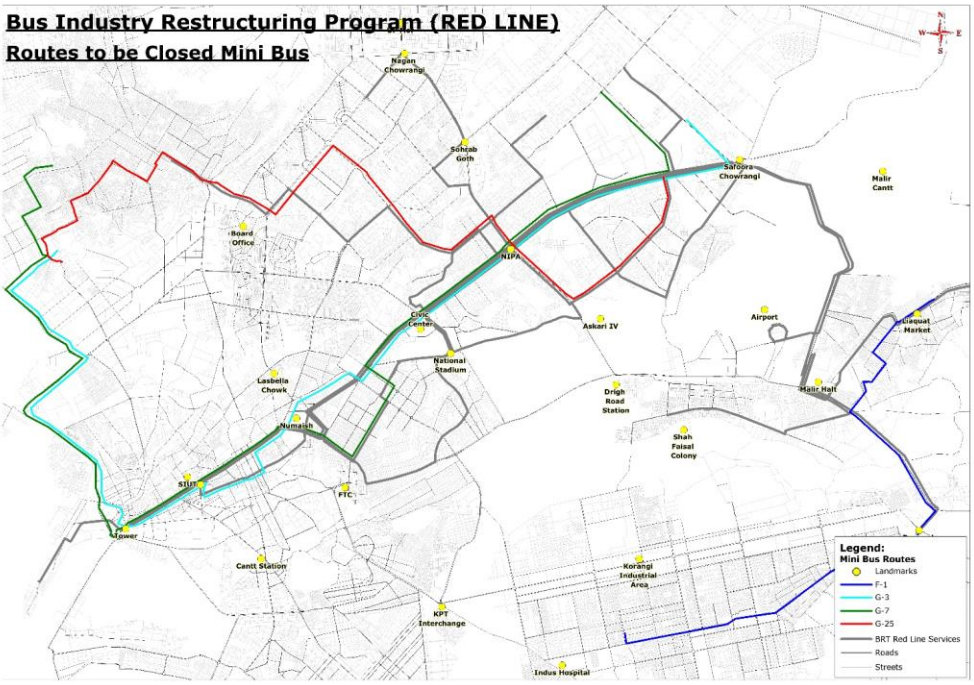


Figure 1: Mini Bus Route to be Closed

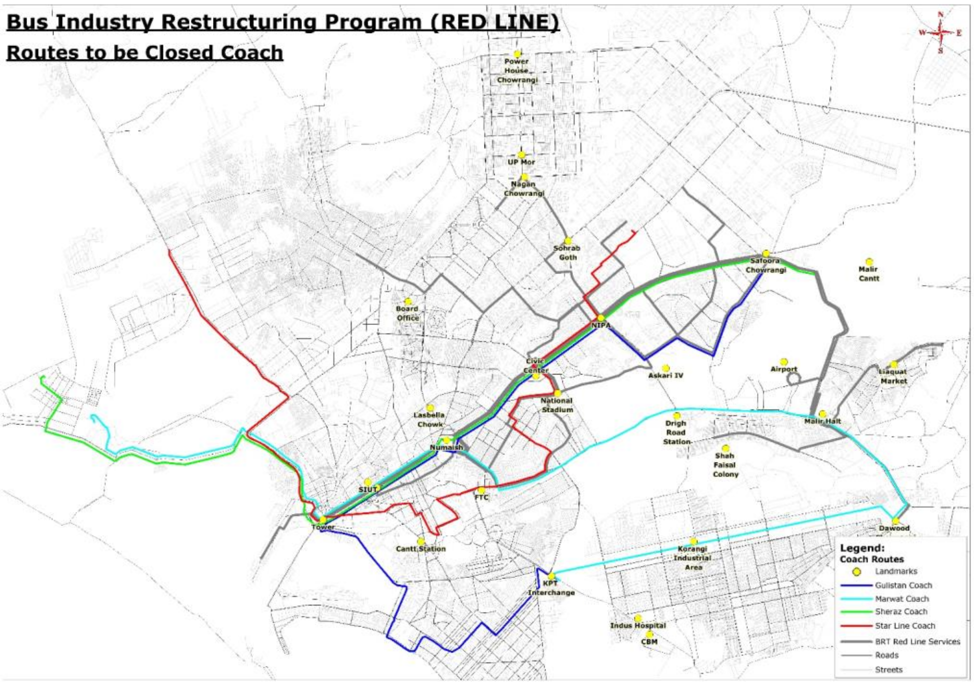


Figure 2: Coach Routes to be Closed

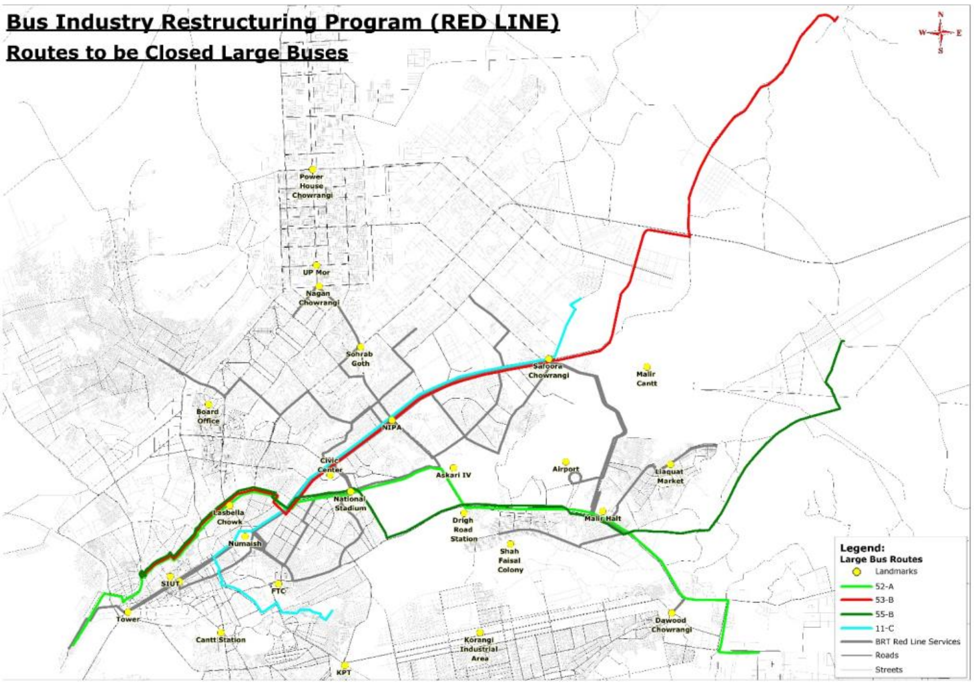


Figure 3: Large Bus Route to be Closed

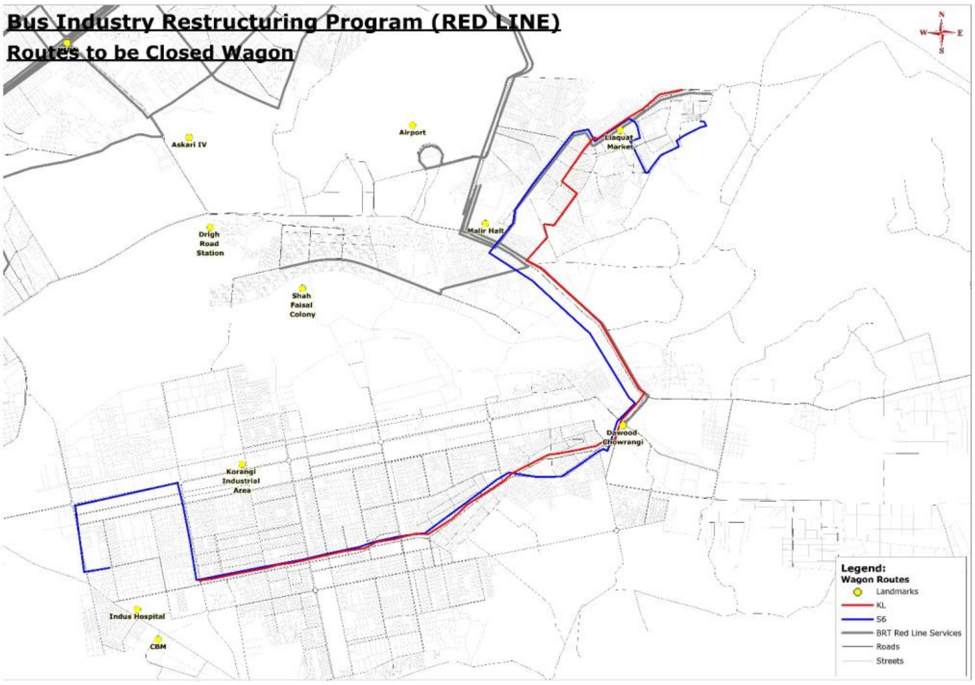


Figure 4: Wagon Routes to be Closed

2.2 Routes to be Curtailed:

The other category of public transport routes that is identified to be affected by the BRTS is that of those that shall be curtailed. Analysis of all the public transport routes revealed that every route serves on multiple key origin destinations. In simple words, each route has multiple routes embedded in it. Therefore those routes which had their route's mid part overlapping with the BRTS have been recommended to be curtailed and assigned shorter routes. However it is ensured that the curtail part has a strong origin destination pair which would make the route sustainable to operate on. The table 2 below show the list of such routes.

Table 2: Route to be Curtailed

ROUTES TO BE CURTAILED					
S.No.	**Route Name**	**Amendment Plan Revised**	**Route Length**	**Origin**	**Destination**
1	4 L	Curtailed	19.6	Lucky One	Empress Market
2	4 Q	Curtailed	12	Memon nagar	Gurumandir
3	A 3	Curtailed	17	Dockyard	Civic Centre
4	D 7	Curtailed	18	Landhi Industrial Area	Millinium Mall
5	Data	Curtailed	18.2	Layari Basti Rd	Nagan Chowrangi
6	F 11	Curtailed	28.2	Landhi/korangi	Tariq Road
7	F 18	Curtailed	24.4	Korangi	Millinium Mall
8	F 21	Curtailed	15.3	Mangopir	Karsaz Flyover
9	G 11	Curtailed	30	Ittehad Town	16 no Chowrangi
10	G 13	Curtailed	21.9	Muhajir Camp	Time Medico
11	G 19	Curtailed	20.2	Hub Dam Road	Time Medico
12	G 27	Curtailed	25.8	Ittehad Town	NIPA
13	Imran	Curtailed	15	Sandspit	Tower
14	Karakoram	Curtailed	18.2	Ittehad Town	Tower
15	M 1	Curtailed	14.9	Qayyumabad	Khalid Bin Waleed
16	P 1	Curtailed	24.5	Mauripur	New town
17	S 2	Curtailed	16.1	Ibrahim Hayderi	Tariq Road/Bahadrabad
18	Safari	Curtailed	42.2	Mangopir	Route 8 Bus Stop
19	Shama Hasan Zai	Curtailed	18.8	Achanak Hotel North Karachi	Gurumandir
20	Super Hasan Zai	Curtailed	16.8	Shirin Jinnah	Route 8 Bus Stop
21	UTS	Curtailed	23.4	Khokhrapar	Pakistan chowk

ROUTES TO BE CURTAILED					
S.No.	**Route Name**	**Amendment Plan Revised**	**Route Length**	**Origin**	**Destination**
22	W 11	Curtailed	21.3	Maymaar	Gurumandir
23	W 18	Curtailed	18.2	Millenium	Creek Rd
24	W 22	Curtailed	21.2	Arsalan homes	Karsaz Flyover

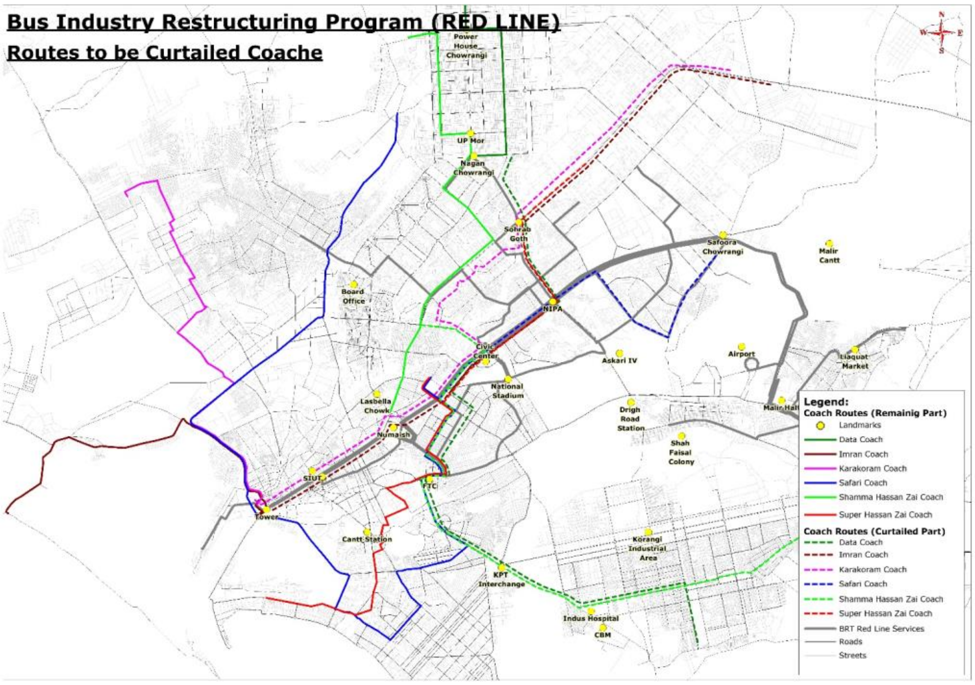


Figure 5: Coach Routes to be Curtailed

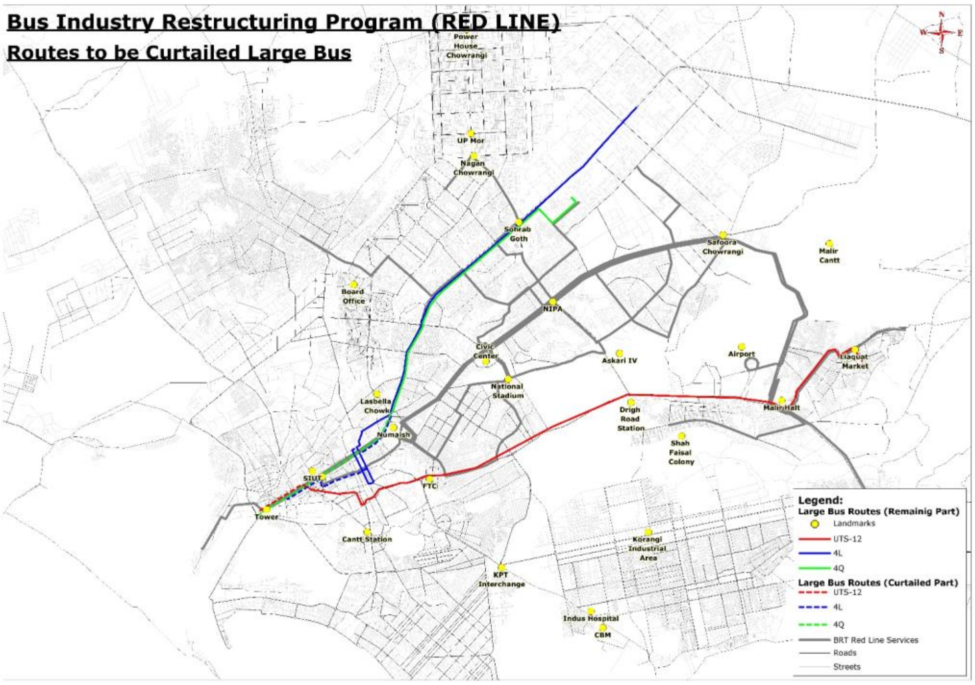


Figure 6: Large Bus Routes to be Curtailed

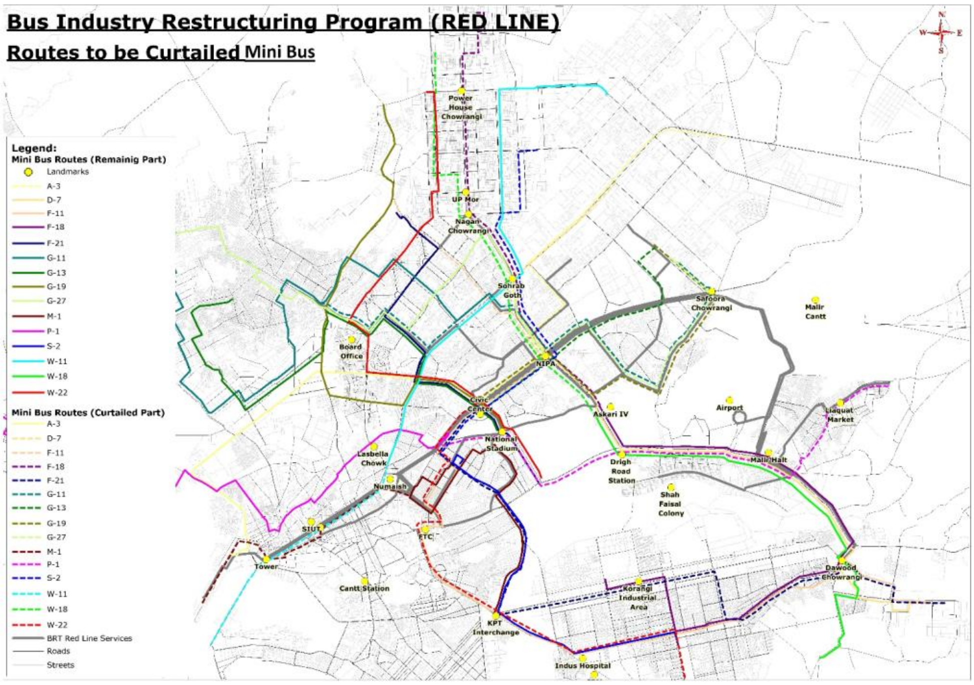


Figure 7: Mini Bus Routes to be Curtailed

2.3 Route to be Realigned:

Finally there are certain routes that had to be slightly re-aligned since a small part of the route overlapped with the BRTS. The table 3 shows the list of such route.

Table 3: Routes to be Realigned

ROUTES TO BE RE-ALIGNED					
S. No.	Route Name	Amendment Plan Revised	Route Length	From	To
1	6	Re-routed	13.9	Lucky One	Empress Market
2	1 D	Re-routed	36.3	Khyber chowk	Allah wala town
3	5 C	Re-routed	15.3	RIG School/Ancholi	Empress Market

ROUTES TO BE RE-ALIGNED					
S. No.	**Route Name**	**Amendment Plan Revised**	**Route Length**	**From**	**To**
4	Awan	Re-routed	29.9	Khyber chowk	Clifton (Siddique wahab Rd)
5	H 2	Re-routed	23.8	Ibrahim hayder	Karachi port (Thorugh Nishtar RD)
6	Masha Allah	Re-routed	22.8	Orangi	Hijrat colony
7	X 10	Re-routed	34.7	Ittehad Town	DHA (Clyton Rd)
8	Bilal Coach	Re-routed	46.5	Ittehad Town	Mehran Hwy (Commercial Area)
9	X 23	Re-routed	45.3	Ittehad Town	Civic Centre

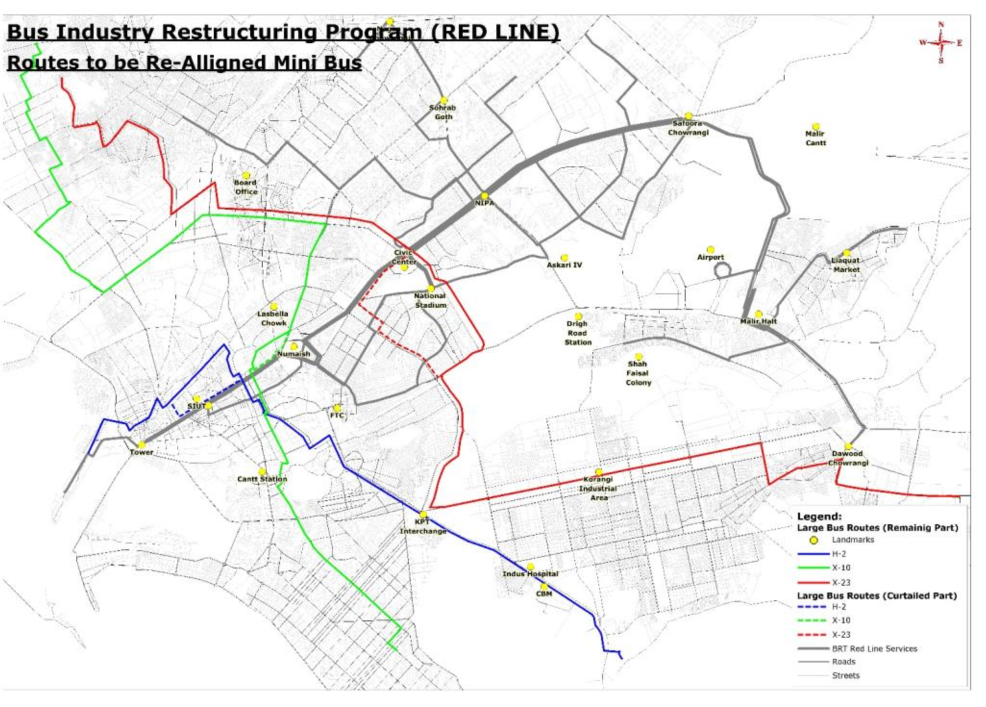


Figure 8: Mini Bus Routes to be Realigned

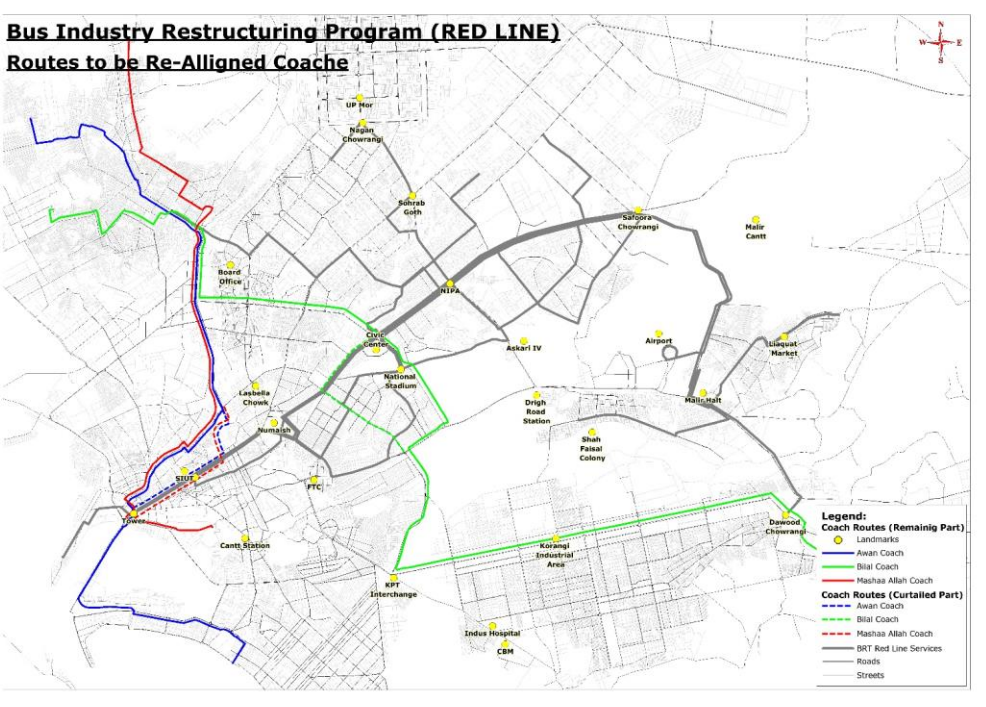


Figure 9: Coach Routes to be Realigned

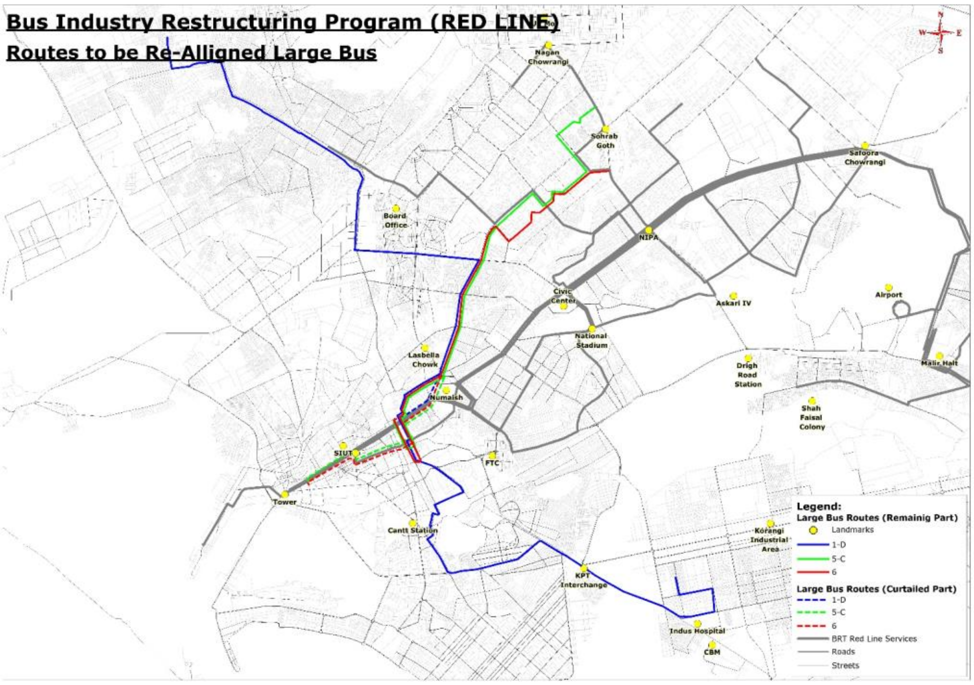


Figure 10: Large Bus Routes to be Realigned

3 Compensation Policy: Vehicle Owners

The compensation program includes all three categories of stakeholders that have been mentioned earlier.

1. Vehicle Owners
2. Vehicle Driver & Conductor
3. Terminal Management Team

The compensation program shall include only those stakeholders who are associated with the operations of the routes that are destined to be closed after the launch of Red Line BRTS operations. The following sections shall explain the compensation plan for each of the above mentioned stakeholders.

3.1 Defining Vehicle Owners:

The owners of the vehicle can be classified into three further categories:

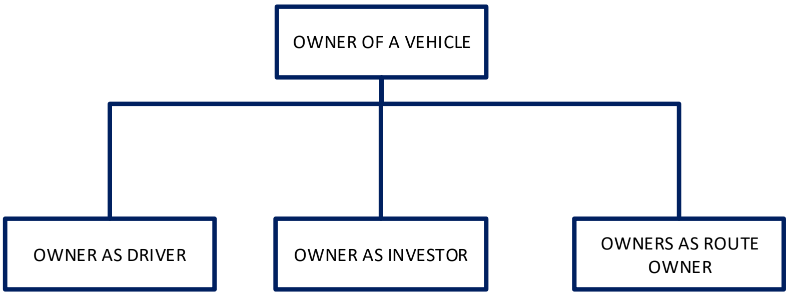


Figure 11: Categories of Vehicle Owners

3.1.1 Owners as Drivers:

The survey data reveals that approximately 27% of the vehicle owners drive their own vehicles. They do so in order to save the expenses of hiring a driver. These owners will be easy to locate and communicate with since they will be available at their route terminals.

3.1.2 Owners as Investors:

Majority of the owners of the vehicles hire a driver and conductor to operate their vehicles and set a profit/loss sharing mechanism. Such owners are not available on the terminals and in most of the cases work at another place or in others cases are not even in Karachi. Therefore communicating with them may not be an easy task.

3.1.3 Owners as Route Owner:

Even though the owner of every route is the Regional Transport Authority, the route management team (defined earlier) is effectively recognized as the owner of the route. Most of the route owners also own multiple vehicles which they operate on the routes they own. The route owners will in any case be the most difficult group to negotiate with. The compensation mechanism for closure of the route these stakeholders own, is explain in section 5 of the report. However, for the vehicles they own, they shall be offered the same program which is to be offered to the other vehicle owners.

The route owners are generally not available on the terminals but are easily accessible elsewhere in most of the cases. Even though the compensation plan for all three owners' types will be same, the consultation process may vary for each category.

3.2 Compensation Offer

The section below explains the compensation program for the owners of the vehicles which operate on routes that have been recommended for closure after the operations of the red line.

The owners of a vehicle shall be given the following choices:

3.2.1 Option 1:

Leave the industry and sell the buses to Government and get the following as compensation:

- A justified purchase value of the bus
- Business loss compensation money of 1 year.

3.2.2 Option 2:

In case the vehicle owner is not interested in selling his/her vehicle, the following shall be offered as compensation:

- Route permit for a "C"-Category Routes (1 year fee waved)
- No scrapping and compensation amount to be paid in this case

The details regarding the criteria for eligibility and for the compensation amount has been discussed in section 3.2 and 3.3 respectively. The category "C" routes are yet to be developed and shall be designed in such a way that they cater the areas that are left unserved after the closure of the existing routes. The actual picture regarding these routes shall be part of the next edition of this report.

3.3 Criteria for Eligibility: Documentary Requirements

For a vehicle owner to be eligible for the compensation, he/she will be required to prove the following:

1. The current/latest route of operations of vehicle to be from the list of those routes that are to be closed.
2. The legal ownership of the vehicle.

The fulfillment of these two conditions must be a prerequisite for any person to be eligible for the compensation. Failure to ensure any aspects of the two conditions shall lead disqualification of the concerned vehicle owners.

In order to evaluate the legalities of above mentioned conditions, mechanism had to be developed that should be consistent with the policies of the state, the concerned institutions as well as the market norms. There the following section lists down the documents that shall provide the legal coverage to the mentioned conditions.

3.3.1 Vehicle Ownership Documentation

The owner of a vehicle would have to prove the legal ownership of the vehicle by providing the relevant legal documents. The documentary that are listed on table 4 shall be required from the owner for him/her to become part of the compensation plan. As a prerequisite the owner shall be asked to fill a form that should mention all the personal and professional information. The form is yet to be developed and shall be part of the next version of this work package. The table 4 below shows the list of documents that shall be required to prove the legal ownership of a vehicle and the concerned department that is responsible to issue these documents.

Table 4: Vehicle Ownership Documents

S. No	Vehicle Ownership Documents	Concerned Department
1	Original Registration Book	Excise & Taxation (E&T)
2	All Transfer Letters (With Affidavit)	Excise & Taxation (E&T)
3	Engine Number Verification Stamp (If changed)	Excise & Taxation (E&T)
4	Chassis Number Verification (Should match the number which is on the Registration Book)	Excise & Taxation (E&T)
5	Sale Certificate	Federal Board of Revenue (FBR)
6	Vehicle Sale Invoice	Dealer/Company
7	Vehicle Delivery Letter	Dealer/Company

Each of these documents shall be verified by the concerned authority. The mechanism of verification and the structure of the body that shall be handling the process shall be developed after consultation with the concerned authorities.

3.3.2 Vehicle Operations Documents

The other component of the eligibility for compensation is the documentary requirements for the operations of a vehicle. The documents mentioned below on table shall be required from the owner to ensure that the vehicle owner held the legal authority to operate as a commercial vehicle and to operate on the routes that are to be covered under the compensation plan. This is ensure that only the deserving vehicle get compensated for their loss.

Table 5: Vehicle Route Operations Documents

S. No	Vehicle Operational Documents	Concerned Department
1	Motor Vehicle Tax (Both Running Part & Book)	Excise & Taxation (E&T)
2	RTA's NOC for Sale of Commercial Vehicle	Regional Transport Authority (RTA)

S. No	Vehicle Operational Documents	Concerned Department
3	Route Permit Original Both Part "A" & "B"	Regional Transport Authority (RTA)
4	Vehicle Fitness Certificate	Transport Department (GoS)

Each of these documents shall be verified by the concerned authority. The mechanism of verification and the structure of the body that shall be handling the process shall be developed after consultation with the concerned authorities.

3.3.3 Expected Issues:

Issue 1. The vehicle registration and route permit is not on the name of claimant/owner – how should the ownerships be proved.

Solution. Purchase Contract/ Affidavit, Open transfer letter, registration book and rout permit are mandatory to prove the ownership in that case. The route permit too has to be issued on the name of the vehicle owner. Final policy should however be communicated after discussion with the RTA.

Issue 2. The vehicles are bought on installments, which are still due.

Solution. Installments plans are agreed between the individuals therefore should be cleared before the program – no vehicle with due installments may be considered – however final policy should be communicated after consultation with concerned authorities.

Issue 3. Motor Vehicle Tax (MVT) are not paid since several years. Can Government pay the MVT and less the buying price of the vehicles accordingly.

Solution. The MVT should be paid to Excise and Taxation department and is a mandatory requirement to be enlisted for the compensation plan. Any possibility of adjusting the amount in the vehicle purchase price shall be discussed with concerned departments.

Issue 4. The chassis number has disappeared and is not visible to a naked eye. How would such a chassis number be verified?

Solution. Such chassis numbers shall be sent to the excise and taxation lab which is designed to cater such problems.

3.4 Setting the Compensation Amount: Business Loss

The table 6 below shows the average savings/profit of a vehicle owner per month from a single vehicle. The expenses include all operational (staff salaries, fuels etc.), routine (Oils, challans, cleaning, puncture etc.) and periodic (battery, tire, gear, engine, taxes etc.) expenses.

Table 6: Revenue Expense Model of a Vehicle Owner

Type of Mode	Avg. Daily Earnings (PKR)	Avg. Daily Expenses (PKR)	Avg. Net Income/Day (PKR)
Buses	7,660	6,507	1,152
Coaches	7,200	6,214	986
Mini Buses	7,070	6,144	926
Wagons	4,740	3,525	1,215

The compensation amount for the loss of business has therefore been taken as an average of the above mentioned figures i.e. Rs 30,000. Since the compensation amount is for a period of one year, this amount adds up to Rs 360,000.

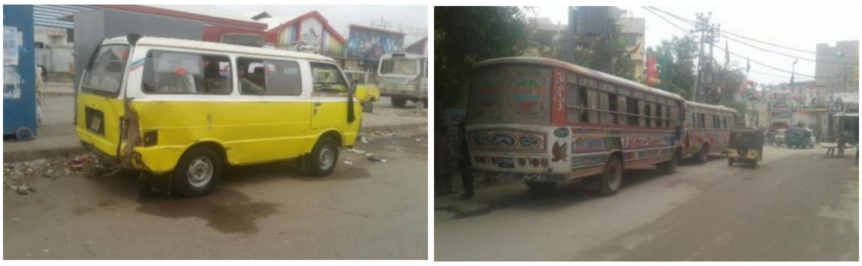
Table 7: Business Loss Compensation Model of Vehicle Owner

Monthly Profit (PKR)	Compensation Period (Month)	Total Amount (PKR)
30,000	12	360,000

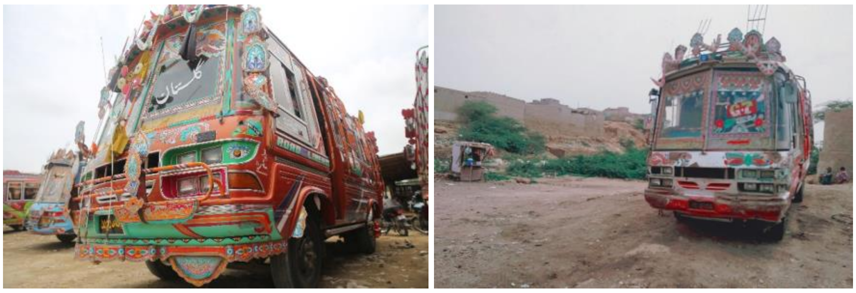
3.5 Setting the Compensation Amount: Vehicle Scrapping Plan

The survey data revealed that there are primarily four types of vehicles that are being used in the operations of the public transport in Karachi.

1. Large Buses
2. Mini Buses
3. Toyota Wagons
4. Coaches



Mini Bus/Wagon (Toyota) Bus (Beford)



Coach (Mazda) Mini-Bus (Mazda)

Figure 12: Pictures of Types Vehicles in Operation

Even though the mini-buses and coaches were launched in different time periods, they have lost their distinction over time. The existing fleet of these vehicles have become very similar in their appearances, functions and even prices. Keeping this particular feature in view, the price evaluation criteria has been kept uniform for the two categories.

The Figure 13 shows the average prices of these vehicles collected through the BIRP survey. The survey data has been used to determine a price that has been used to develop a budget for the entire compensation program. The budgetary price is an average of prices collected from the survey, plus an amount which represents one standard deviation of the data and an additional amount which shall account for the inflation factor that may occur from the time of budget allocation to the time of actual compensation disbursement.

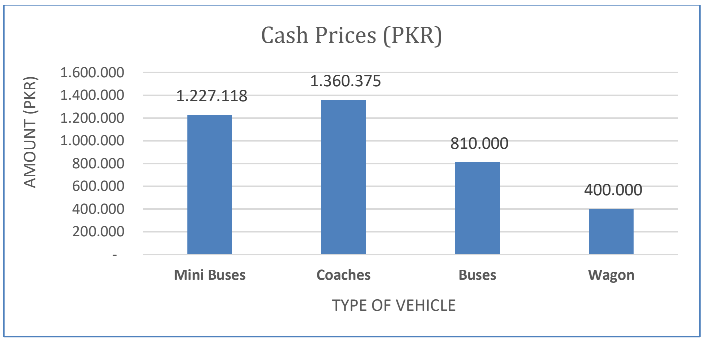


Figure 13: Average Prices of Vehicles By Categories

However, the price that should be used as a benchmark to evaluate each vehicle (by category) against, has been determined using another round of market price survey. The benchmark price shall be used as a threshold against which to price each vehicle using a vehicle condition evaluation criteria framework explained in section 3.5.1, the next section of this report. This market survey was done not just to determine the price of a vehicle but also to determine the rationale/criteria of a vehicle pricing in the market. The benchmark price is supposed to reflect the value of a vehicle which is to be given maximum compensation amount or, in other words, scores the maximum evaluation points (refer to table 9). Therefore a criteria has to be developed which could justify the price by illustrating the breakup of the price by the major components of a vehicle.

The benchmark price is now a reflection of the accumulation/composition of the values of various key components of a vehicle. These values reflect the maximum price/value of the vehicle components shown in table 8 below.

3.5.1 Setting the Benchmark Price

The mechanism of calculating the budgetary price of a vehicle is based on formula that adds the following elements:

1. Average of the prices of the vehicles collected from the BIRP survey
2. One Standard Deviation of the data collected from the survey to account for a larger segment of the fleet and also to address the element of lease amount to a certain degree.
3. Inflation rate that is expected to influence the price from the time of budget development to the time of compensation disbursement.

The Table 8 below shows the statistical spread of the prices of vehicles determined for budgeting of compensation amount.

Table 8: Budgetary Price of Vehicles by Categories

Vehicle Type	Average Price (PKR)	One Standard Deviation (PKR)	Total (PKR)	Total PKR (Inflation @4%)
Mini Bus	1,227,118	401,500	1,628,618	1,700,000
Coach	1,360,375	317,417	1,677,792	1,800,000
Large Bus	810,000	183,420	993,420	1,000,000
Wagon	400,000	75,000	470,000	500,000

The following section of the report shows the charts of the standard deviation curve of each vehicle category. Statistical analyses were performed on the vehicle prices noted during the BIRP surveys to take calculated decisions for the pricing policy. The data was found widely spread with positively skewed distributions; however, the difference between the mean and median is not found significant. The distributions are shown as below:

3.5.1.1 Mini Buses:

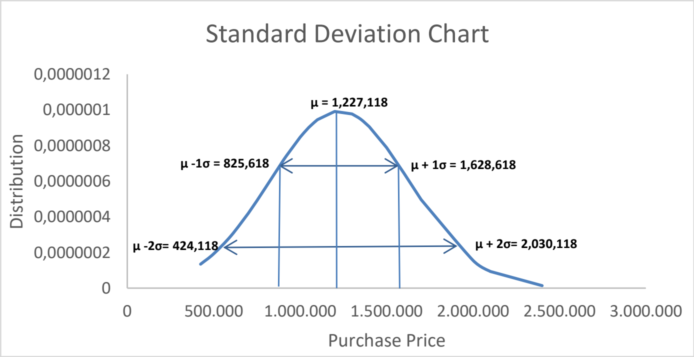


Figure 14: Standard Deviation Chart of Prices of Mini Bus Prices

3.5.1.2 Coaches

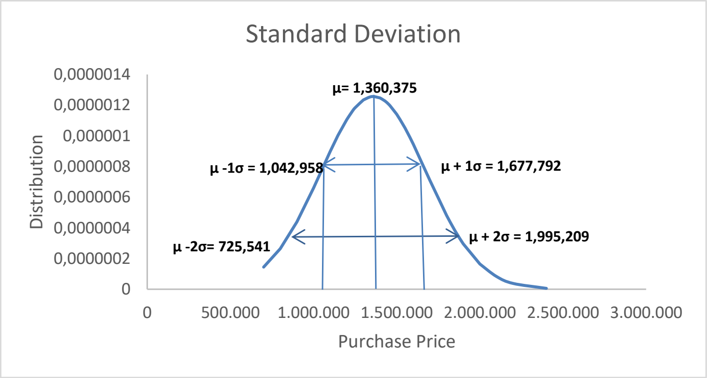


Figure 15: Standard Deviation Chart of Coach Prices

3.5.1.3 Large Buses

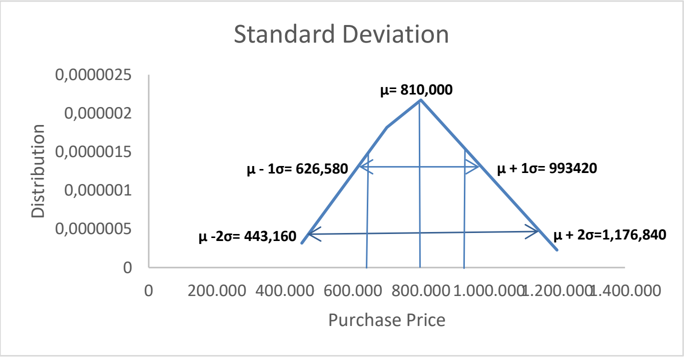


Figure 16: Standard Deviation Chart of Large Bus Prices

3.5.2 Vehicle Price Evaluation Criteria

It is important to note that determining a justified price of a vehicle is one of the most difficult and trickiest task to perform. More so, developing a standard pricing framework for multiple vehicles becomes even tougher since the market does not explicitly perform a formal exercise to determine the price by evaluating each component of a vehicle. Rather the pricing is done in an informal manner by giving weightage to a few major components such as the engine, body and transmission. This weightage that is given to each of these components is a tricky exercise and requires assessment from multiple dimensions.

Therefore, in order to develop a standard evaluation framework for different types of vehicles, the price of each vehicle category had to be broken down to its major components. The point's evaluation criteria for Karachi is divided into two major parts;

1. The physical condition of the vehicle (Vehicle's Components)
2. The model (Year of Registration) of the vehicle (Only for Mini Buses and Coaches)

The assessment of the physical condition of a vehicle required assigning weightages to different components of a vehicle in such a way that the sum of the values of those components is approximately equal to the "Benchmark" price of the vehicle.

The rationale behind assigning these weightages/points is evident from the figures shown in Table 10, Table 14 and Table 15 respectively for each vehicle category. These tables show the breakup of a vehicle's price by its key components. Since these values differed with the different categories of vehicles, a different points table has been developed for each vehicle type i.e. mini buses & coaches, large buses and wagons.

Both of these factors have been assigned a certain weightage (shown in Table 9) in such a way that they shall reflect the total value of a vehicle as a sum of 100 points. Each of the vehicle shall be evaluated against these weightages for its compensation price determination. Since the Wagons and the Large Buses are more than 40 years old, the model factor becomes irrelevant in pricing of the vehicles.

Payment Price of a Vehicle = Benchmark Price x Sum of Points Earned (Physical Condition + Vehicle Model)

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The "Sum of Points Earned" may also be labelled as "Vehicle Assessment Factor". Based on the results of the market survey, the following weightages have been assigned to above mentioned criteria.

Table 9: Vehicles Points Evaluation Table

Vehicle Type	Vehicle Physical Condition (Percentages as Points)	Vehicle Model Value (Percentages as Points)	Total Value (Weightage in Points)
Mini Buses	85	15	100
Coaches	85	15	100
Large Buses	100	0	100
Wagons	100	0	100

The rationale for setting the weightages and the further breakup of these two heads have been explained below in detail.

3.5.2.1 Evaluation Criteria: Mini Buses & Coaches:

As mentioned earlier, the mini buses and coaches have lost their distinction over time. Therefore a single points table has been developed for the two categories. A total of 85 points out of 100 has been assigned to the physical condition of the mini buses and coaches. The remaining 15 points have been assigned to the model of the vehicle, explained in the next section.

Table 10: Break of Mini Buses & Coaches Benchmark Price

Mini Bus & Coach			
Description	**Cost**	**Percentage**	**Points**
Engine	250,000	14%	0-15
Gear	95,000	5%	0-5
Other Parts (Axel, Breaks, Crank Shaft etc.)	125,000	7%	0-10
Body	600,000	33%	0-30
Chassis	400,000	22%	0-20
Tire	80,000	4%	0-5
Model	250,000	14%	0-15
Total	**1,800,000**	**100%**	**0-100**

The results of the market survey reveal that the model of a vehicle does have a significant impact on the overall price of a vehicle. However this impact is limited to those vehicle categories which till recently have added vehicles to their respective fleets such as the minibuses and the coaches. For vehicle such as a Large Bus and Wagon, which discontinued addition in their fleets well before 30 years from now, the model factor becomes irrelevant.

The market price survey revealed that vehicles of recent model (Post 2000) worth approximately Rs 200,000 more than the vehicles of older models (80's and early 90's). Since Rs 200,000 makes approximately 15% of the benchmark price (Rs 1.8 million), therefore the following points have assigned against to the model of a vehicle.

Table 11: Coaches & Mini Buses Model Points Break up

Vehicle Model (15 Points)		
Vehicle Type	**Vehicle Model**	**Points Out of 15**
Mini bus	Pre 1978	0
	1978-1988	5
	1989-2000	10
	2000 Onwards	15
Coaches	1993-2000	10
	2000 Onwards	15

The rationale for setting the "year of make"/model of vehicle brackets is evident from the statistics shown in Table 12 and Table 13 below. In the case of Mini Buses, the spread is much larger, therefore the budgetary price (1.7 million) is different from the benchmark price (1.8 million). The budgetary price is based on the average price, which is slightly lower than that of the Coaches. Whereas the benchmark price, which accounts for the latest models that have entered the fleet, had to be kept similar since both categories have similar number of vehicles entering their respective fleets post year 2000.

Table 12: Coaches Age Bracket Table

Coaches		
Years Bracket	**Vehicle Count**	**Percentage of Count**
2000 Onwards	204	33%
1992-1999	416	67%
Total	**620**	**100**

Table 13: Mini Buses Age Bracket Table

Mini Buses		
Year Bracket	**Vehicle Count**	**Percentage of Count**
2000 & Onwards	42	21%

Mini Buses		
Year Bracket	Vehicle Count	Percentage of Count
1988-1999	56	28%
1977-1987	100	50%
Pre 1978	4	2%
Total	**202**	**100%**

3.5.2.2 Evaluation Criteria: Large Buses

The point evaluation framework for the large buses is shown below in table 14. Each component has been assigned a certain percentage/points based on the weightage it contributed to the total price of the vehicle category.

Table 14: Large Buses Points Evaluation Table

Large Bus			
Description	Cost	Percentage	Points
Engine	250,000	25%	0-25
Gear	80,000	8%	0-8
Other Parts (Axel, Breaks, Crank Shaft etc.)	80,000	8%	0-10
Body	400,000	40%	0-40
Chassis	100,000	10%	0-8
Tire	90,000	9%	0-9
Model Price		0%	
Total	1,000,000	100%	0-100

3.5.2.3 Evaluation Criteria: Wagons

The Table 15 below shows a similar point evaluation framework for the wagons.

Table 15: Wagons Point Evaluation Table

Wagon			
Description	**Cost**	**Percentage**	**Points**
Engine	60,000	12%	0-15
Gear	10,000	2%	0-5
Other (Suspension, Brakes etc.)	80,000	16%	0-15
Body & Chassis	275,000	55%	0-50
Tire	75,000	15%	0-15
Model Price	-	0%	-
Total	500,000	100%	0-100

3.6 Mechanism of Compensation Disbursement

The mechanism of distributing the compensation shall be developed once these compensation plans have been discussed formally with the concerned departments. Once the policy is formally accepted by the concerned departments, the stakeholders shall be communicated these policy through multiple source such as newspaper, radio etc.

The interested owners will be asked to register themselves with the concerned body once the compensation plan is finalized and communicated to the stakeholders. And the owners shall be asked to fill in a form which shall require their personal and vehicle related information. The form will also require the owner to mention the names of the drivers and conductors of his/her vehicle. The mentioning of the driver and conductor's name will ensure, at least to some extent, that only the deserving stakeholders will be compensated in the transition period.

4 Compensation Plan: Drivers & Conductors

As stated earlier, the driver and the conductors shall be compensated in shape of giving them preference of other applicants in hiring for jobs that are to be created by the functioning of the BRTS system. The jobs may be of the following nature:

- Driver
- Conductor

- Security Guards
- Mechanics

The drivers and conductors will be invited to enlist themselves at the BIRP desk.

4.1 Issues dealing with the enlistment process:

The following issues are expected to be encountered during the compensation program for the drivers and conductors of the affected routes.

- There is a significant sized pool of drivers and conductors which works on daily wages and is not associated with any particular vehicle. In order to induct this category in the compensation plan, it is important to identify such a group and verify their working status in such a way that only the deserving ones get the benefit in the process.
- It is also important to verify the working status of those who claim to be permanently associated with a vehicle before enlisting them in the compensation plan.
- The purpose is to ensure that a transparent and merit based mechanism be developed to accommodate only the deserving candidates.

In order to curb with the above mentioned discrepancies the owner of vehicles who are interested in the compensation plan shall be asked to mention the details of the drivers and conductors associated with his/her vehicle. In this way, it is expected that only the level of discrepancies would be dealt with up to a certain degree.

4.2 Enlistment Process:

Each interested driver and conductor will be asked to register himself with the designated body. The driver/conductor will be required to fill a form which will have the following information:

Personal Information:

- Name
- Father Name
- NIC
- Contact Number

Professional Information:

- Route of Operations
- Years of Operations

- License Status (For Drivers Only)

Vehicle Information:

- Registration ID of Vehicle (Multiple Choices)
- Name of Vehicle Owner
- Vehicle Owner’s Contact Number

The list of interested drivers and conductors shall be matched with the list of drivers and conductors provided by the vehicle owners. Those with the authentic information shall be given preference in the hiring process. Further details regarding the process mechanism shall be shared after discussions with the concerned stakeholders.

5 Compensation Policy: Route Owners

As explained earlier in section 3.1.3 of the report, the owners of the routes are the most important and influential stakeholders of this industry. The route owners may not be an officially recognized entity, but they hold a very strong customary right of compensation for the large financial and physical capital that they had invested to establish and operate the route over the years

However due to the level of influence the route owners have on the industry, they are the most difficult stakeholders to deal with. Any premature communication regarding the industry restructuring program/compensation plan may jeopardize the entire project. Therefore in order to develop a justified compensation mechanism for them, the route owners had to be interviewed in such a way that the information regarding their revenues and expenses could be determined without them finding about the actual purpose of the exercise.

The results of the BIRP survey reveals that on an average a public route operates with approximately 40 vehicles. The revenues and expenses analysis reveal that a route which operates with a fleet of 40 vehicles saves approximately Rs 6 Million per year. Dividing this amount by the number of vehicles reveal that a route management team earns roughly around Rs 150,000 per vehicle per year. The following section explains the breakup of the above mentioned amount.

5.1 Revenue Model:

The working mechanism of the route owners explained in the section 3.1.3 of this report. The owner, who works with the help of his team, does all work that is needed to operate a route. This includes investing in setting up a route, managing its operations, managing the terminals, paying for the utility services, dealing with the law enforcement agencies and the Regional Transport Authority (RTA). In return for their services, the route managing team charges the vehicle owners the following fee.

- **Adda Fee:** Each vehicle has to pay a certain amount at the terminal for getting the pass to enter the operations for each round trip. On an average each vehicle pays approximately Rs 450 per day as Adda fee for two round trips.
- **Token Fee:** Each vehicle is also charged token on the route. The vehicle is charged multiple times on a single round trip. This amount sums up to approximately Rs 200 per day for two round trips.
- **Fleet Size:** In order to determine the gross revenue of a route owner, it is important to have the correct fleet size of the route. The fleet size for this exercise has been calculated using the data collected from the various surveys. For the purpose of calculating the estimated revenues of a route owner, an average of 40 vehicles have been considered to be operating on the route. The Table 16 below shows the gross revenue of a route owner based on the variables defined above.

Table 16: Revenue Model of Route Owner

REVENUES (Per Month)	Amount
Operative Fleet Size	40
Adda Fee (Per Day)	450
Token Fee (Per Day)	200
Total Revenue (Per Day)	26,000
Total Revenue Single Route (Per Month/PKR)	728,000

5.2 Expense Model:

The expenses incurred by a Route Owners were relatively more difficult to determine since the authentic information could only be collected from the route owners rather than the team working for him on the terminal. The expenses and their respective heads have been determined through the discussion sessions with the held with the route owners at the NED University. The heads of expenses are as follows:

- **Police Challan Contribution:** An amount that is contributed by the route management team as a percentage of total monthly challan amount of a vehicle. The percentage varies with each route and therefore an average amount of Rs 1,000 has been assigned to this expense head.
- **Utilities Expenses:** This head includes the water, electricity and other such expenses incurred at the terminal.

- **Space Rent:** Even though most of the terminals spaces have been purchased by the route owners, some have rented the spaces. A large number of the routes do not have a formal terminal and are using road sides as parking for the vehicles. The Route Owner also pays rent for the two terminals that are located one at each end of the route.
- **Salaries:** The salaries may include those for the terminal manager (Adda Managers) and the token in charge.

Table 17: Expense Model of a Route Owner

EXPENSES (Per Month)	Amount
Police Challan Contribution (Per Month) @ 1000/Vehicle	40,000
Payment at Police Chawkis (Per Month)	10,000
Miscellaneous Expenses (Per Month)	20,000
Terminal Rent (Both Terminals)	10,000
Electricity (Per Month)	15,000
Gas & Water (Per Month)	15,000
Terminal Manger Salary (4 Managers@ 25K/Month)	100,000
Token Wala Salary (4 Persons @ 20K/Month)	80,000
Total Expenses One Route (PKR Per Month)	290,000

5.3 Setting the Compensation Amount:

The revenue expense model of a route owner reveals the following profitability structure.

Table 18: Profitability Model of Route Owner

Profitability/Compensation	Amount (PKR)
Total Profit Per Month (PKR)	438,000
Total Profit Per Year (PKR)	5,256,000
Profit per Vehicle (1 Year)	130,000

Rounding off the figure of profit per year, it can be stated that a route owner earns roughly around Rs 150,000 per vehicle per year. Considering the fact that the route management team invests heavily to initiate a route, it is suggested that the compensation should cover at least a period two years loss of business expected from the introduction of the BRTS. Therefore the compensation amount for the route owner becomes Rs 300,000 per vehicle. This amount shall be multiplied with the number of vehicle officially operating (holding RTA route permit) on the route that is to be considered under the compensation plan.

Total Compensation per Vehicle = Profit per Vehicle x Two Year Period x Operative Fleet Size

6 Budget Summary

This section provides a summary of the budget developed for the compensation program of the Red Line BRTS. It includes the budget summary of the following components:

- Scrapping Program Compensation Amount
- Business Loss Compensation Amount for the Vehicle Owners
- Business Loss Compensation Amount for the Route Owners

6.1.1 Estimated Fleet Sizes of Routes:

The Table 19 shows the estimate fleet size of the routes that are recommended to be closed after the operations of red line BRTS.

Table 19: Estimated Fleet Size of Routes to be Closed/Offered Compensation

Coaches to be Closed		Mini Buses to be Closed		Large Buses to be Closed		Wagons to be Closed	
Route ID	No. of Vehicles	Route ID	No. of vehicles	Route ID	No. of vehicles	Route ID	No. of vehicles
Gulistan	30	G3	80	53B	5	KL	40
Sheraz	70	G7	60	55B	5	F1	80
Marwat	110	G17	40	11C	22	S6	60
Star Line	20	G25	30	52A	10		
Total Fleet Size	**230**		**210**		**42**		**180**

6.1.2 Vehicle Scrapping Compensation Amount

The Table 20 shows the amount to be offered to the owners of vehicle in return of buying their vehicles for the purpose of scrapping. It is assumed that all the vehicle owners will be interested in selling their vehicle to the government. Details regarding the unit rate is part of the section 3.5.1.

Table 20: Bus Scrapping/Procurement Budget

Purchase of Vehicles			
Type	Estimated Fleet Size	Unit Rate (PKR/Vehicle)	Total (PKR)
Wagon	180	500,000	90,000,000
Large Bus	42	1,000,000	42,000,000
Coach	264	1,800,000	475,200,000
Mini Bus	176	1,700,000	299,200,000
Sub Total	662		906,400,000

6.1.3 Business Loss Compensation Amount

The Table 21 shows the amount that is allocated for the compensation of the loss in business of the vehicle owners that may be incurred due to the closure of their route of operations. The details regarding the unit rate is part of the section 3.4 of the report.

Table 21: Vehicle Owner Business Loss Compensation Budget

Income Compensation to Vehicle Owners			
Type	Estimated No of Vehicle Owners	Unit Rate (PKR/Year)	Total (PKR)
Wagon	180	360,000	64,800,000
Large Bus	42	360,000	15,120,000
Coach	264	360,000	95,040,000
Mini Bus	176	360,000	63,360,000
Sub Total	662		238,320,000

6.1.4 Route Owner Compensation Amount

The owners of the routes are to be compensation based on the mechanism explained in section 5 of the report.

Table 22: Route Owner Compensation Budget

Income Compensation to Route Management Team			
Type	**Estimated Fleet Size**	**Unit Rate (PKR/Bus)**	**Total (PKR)**
Wagon	180	300,000	54,000,000
Large Bus	42	300,000	12,600,000
Coach	264	300,000	79,200,000
Mini Bus	176	300,000	52,800,000
Sub Total	662	-	198,600,000

6.1.5 Summary

The Table 23 shows the summary of the budget developed for the compensation program.

Table 23: Red Line BRTS BIRP Budget Summary

Budget Head	Description	Coaches	Mini Buses	Large Buses	Wagons	Total Amount (PKR)
	Estimated Number of Vehicles	264	176	42	180	662
Vechile Scrapping Compensation	Price for Scrapping (PKR)	1,800,000	1,700,000	1,000,000	500,000	
	Budget Requirement for Scrapping Payments (PKR)	475,200,000	299,200,000	42,000,000	90,000,000	906,400,000
Business Loss Compensation (12 Months)	Business Loss Compensation Rate Per Month	Rs. 30,000/month to each owner for 1 Year (considering everyone shall leave the system)				
	Total Salary Compensation (PKR)	95,040,000	63,360,000	15,120,000	64,800,000	238,320,000
Route Owner Compensation Amount	Compensation Rate Per Vehicle	Rs 300,000 Per Vehicle				
	Total Compensation (PKR)	79,200,000	52,800,000	12,600,000	54,000,000	198,600,000
					Total	1,343,320,000
					Contingency @ 5%	671,660,000
					Gross Amount (PKR)	**1,410,486,000**

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7 Policy Implementation Process

In order to keep the process of policy development safe from untimely disclosure, the consultation sessions with the administrative setup were done only informally. During those sessions the context of gathering information was not revealed and the information was collected based on sharing hypothetical scenarios.

However, in the next phase of this project these policies will have to be formally communicated to all the concerned administrative units for their formal approval. Only once these policies have been approved by the concerned departments, this policy shall be communicated to the affected transport stakeholders. The following departments are to be consulted before the policy is sent for a formal approval to the chief minister:

Administrative Units: TMTD (RTA, SMTA, Fitness Department), Traffic Police and Excise & Taxation

The purpose of consultation will be to take the concerned administrative unit's input on the compensation framework and incorporate the feedback accordingly. Only once the policy has been approved, the policy shall be communicated to the affected transporters. The process of communication shall be finalized after consultation with administrative units.

The implementation of the compensation policy is a very sensitive and a complicated process. It has to be kept in mind that the purpose of this BIRP is to ensure smooth transition of the sector as much as it is to compensate the existing operators for the loss of their businesses. Therefore all unwarranted responses from the existing operators are to be anticipated and addresses in the planning process. Each component of the policy is strongly integrated with the other and demands strict time line management in the process. The other critical aspect of the implementation process is the handling of the disclosure mechanism of the policy information.

All such challenges require a strong state institution to lead the process of policy implementation. Therefore it is recommended that the Sindh Mass Transit Authority (SMTA) leads this process on behalf of the Transport and Mass Transit Department (TMTD). Since this policy has components that require support from multiple state departments for its implementation, the SMTA will have to engage all the concerned departments in an appropriate capacity. The Figure 17 illustrates the recommended process flow for the implementation of the policy.

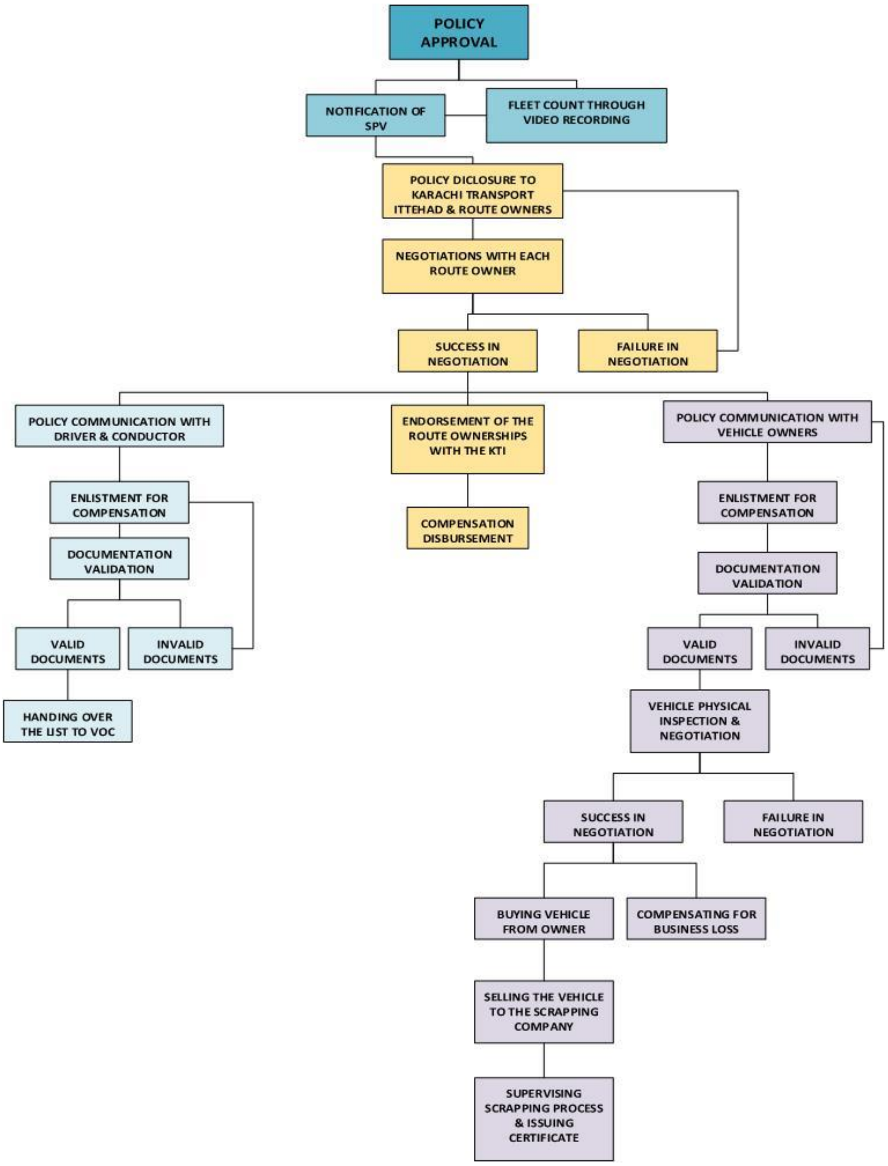
POLICY APPROVAL
NOTIFICATION OF SPV
FLEET COUNT THROUGH VIDEO RECORDING
POLICY DICLOSURE TO KARACHI TRANSPORT ITTEHAD & ROUTE OWNERS
NEGOTIATIONS WITH EACH ROUTE OWNER
SUCCESS IN NEGOTIATION
FAILURE IN NEGOTIATION
POLICY COMMUNICATION WITH DRIVER & CONDUCTOR
ENDORSEMENT OF THE ROUTE OWNERSHIPS WITH THE KTI
POLICY COMMUNICATION WITH VEHICLE OWNERS
ENLISTMENT FOR COMPENSATION
COMPENSATION DISBURSEMENT
ENLISTMENT FOR COMPENSATION
DOCUMENTATION VALIDATION
DOCUMENTATION VALIDATION
VALID DOCUMENTS
INVALID DOCUMENTS
VALID DOCUMENTS
INVALID DOCUMENTS
HANDING OVER THE LIST TO VOC
VEHICLE PHYSICAL INSPECTION & NEGOTIATION
SUCCESS IN NEGOTIATION
FAILURE IN NEGOTIATION
BUYING VEHICLE FROM OWNER
COMPENSATING FOR BUSINESS LOSS
SELLING THE VEHICLE TO THE SCRAPPING COMPANY
SUPERVISING SCRAPPING PROCESS & ISSUING CERTIFICATE

Figure 17: Policy Implementation Framework

7.1 Approval of Policy:

The first step in the process is to communicate the policy to the concerned state departments and attain their approval against all the technical and administrative matters. For this purpose the SMTA shall share the policy with the departments and the consultants shall support the SMTA with explaining the technical details of the policy.

The departments will be expected to provide all relevant administrative support to the executive bodies in the implementation of this policy. This support should include setting the mechanism of responding to the administrative and technical requirements of the executive body in the process of policy implementation. So for instance the excise and taxation (E&T) department would develop an efficient mechanism to verify the documents of a vehicle such as its engine and chassis numbers, the ownership details etc. (shown in detail in Table 4).

7.1.1 Notification of Special Purpose Vehicle (SPV):

In order to implement this multi-dimensional policy, a structured body of experts from multiple departments will have to be formed. Once the policy is approved by all the relevant departments, a Special Purpose Vehicle (SPV) shall be notified. The purpose of this “Special Purpose Vehicle” (SPV) will be to execute and monitor the implementation of the policy. The SPV should ideally have a representation from each of the departments listed above. The body will be responsible for supervising the compensation process and ensuring its implementation in accordance with the approved policy. Each of the member of this executive body will be expected to deal with the aspects of the policy relevant to the department he/she represents. The members should ideally be senior officers having sufficient authority to influence the smooth management in implementation processes.

It is strongly recommended that the SPV has at least one to two representations from the Trans-Karachi and it is headed either by the secretary transport or a representative of TMTD. Since the SPV will be supervising the vehicle evaluation process, it also is suggested that a member of Karachi Transport Ittehad (KTI) should be added in this body. Even though the initial composition may not include any person from the KTI due to the fact that the policy shall only be disclosed once the SPV is notified, provision for a position from KTI would allow accommodation at later stage. As soon as the SPV is notified and its board members selected, the body shall perform the following task:

7.1.1.1 Establishment of a Coordination Desk:

The SPV shall established a desk to deal with the transporters who are willing to enlist in the compensation program. For this purpose the SPV will have to hire and train a staff to operate this desk. The job of the staff at the desk would be to collect the required information and documents from the applicants. The desk shall then dispatch all the documents to the relevant departments for the purpose of verification. The desk shall also correspond with the applicants regarding all the matters pertaining to the application.

7.1.1.2 Hiring an Evaluator for Vehicle Pricing

One of the most critical tasks this body will be expected to perform is to evaluate and offer appropriate prices for the buses that are brought for inspection. The criteria of pricing is explained in detail in section 3.5.2 of this report. One of the reasons for forming this multi-departmental body was to have a diverse set of expertise in the group to perform this task of evaluation. The objective of including the Vehicle Fitness Department in the process of Policy Approval, is to have a relevant state department providing useful insight in the vehicle condition evaluation process.

It is however suggested the SPV hires a vehicle evaluation firm from the open market and allow it to evaluate each vehicle. The Vehicle Fitness Inspection department should be expected to counter evaluate the results given by the commercial evaluator. It is for this particular process that a member of KTI was suggested to be part of the SPV so that all sources of contention in price evaluation may be eliminated with an across a consensus across the board. A vehicle shall be called in for inspection only after all its documents are successfully verified by the SPV.

7.1.1.3 Hiring of a Vehicle Scrapping Company

Since all the vehicles bought in the process will have to be scrapped, the SPV will have to hire a vehicle scrapping company. The scrapping company should have appropriate experience and capacity to meet the threshold of such a task. The basic timeline, pricing and other contract details shall be developed by the SPV in consultation with all the relevant departments, which may also include the environmental protection agencies.

7.1.1.4 Arranging a Vehicle Scrapping Yard

The SPV will also have to the support the scrapping company by providing them an appropriate space for scrapping such a large number of buses. The selection of the location and the mechanism of procurement shall also be developed in consultation with the concerned departments. Since this task of hiring a scrapping company and procuring a scrapping yard may take time, the process should begin as soon as the SPV takes over the operational matters.

7.1.1.5 Coordinating with the Financial Institutions

In order to settle the financial transactions with the vehicle owners, the scrapping company and other vendors, a smooth and safe channel for financial transfers should be developed by the SPV. Some of the larger financial transactions expected in the compensation process may be as follows:

- Buying vehicle from the vehicle owners
- Compensating the vehicle owners for the loss of business
- Compensating the route owners for the loss of business

- Selling the vehicle to the scrapping company

All of these transactions would require a clear understanding between the SPV and the financial institutions (Banks). This may also require meeting certain formalities at both ends such as those related to financial audits.

7.1.1.6 Hiring a Financial Evaluation Firm

The above mentioned financial transitions may also require strong auditory compliances. For this purpose, it is strongly recommended that the SPV hires one of the “Big Four” audit firms. The step would not just streamline the process but also settle risks associated with the auditory and accountability matters. The option of involving state departments such as the treasury department in the process of financial disbursements shall also be evaluated.

7.1.1.7 Coordination with the VOC

Furthermore the SPV will be expected to share the list of interested drivers and conductors with the “Vehicle Operating Company” (VOC). The purpose of sharing the list would be to encourage the VOC to accommodate as many of those drivers and conductors as possible following the due process. Since most of the drivers of the existing public transport hold LTV licenses, driving mass transit buses which require HTV license, would be an issue that the SPV might have to resolve amicably.

7.1.1.8 Monitoring the scrapping process and issuing clearance certificate

Finally the SPV will also be responsible for monitoring and closing the process. The SPV shall issue a clearance certificate to the scrapping company for every bus that gets scrapped in the process.

7.2 Fleet Count via Video Recording:

Once the policy is approved, besides issuing notification for the formation of a SPV, the SMTA shall hire an appropriate agency to perform a video count of the operational fleet of the routes that are listed for closure. The video count shall be done in such a way that the registration IDs of the vehicles are clearly visible. And in order to establish a concrete evidence base, the video recording shall be done for at least three days (same week), for at least 8 hours per day.

The purpose of performing this count is to collect an evidence of the exact size of the fleet and the vehicle registration identities of the buses operating on each of the routes at that particular point in time. The listing of the registration ids’ through the video recording along with the validation of route permits shall help the SPV to compensate only the deserving and legally covered vehicle owners. More importantly, since the route owners are not covered under any legal framework and are propose to be compensate on the total number of operational fleet, this data shall provide the important evidence base to the team negotiating with the terminal/route owners.

Only those vehicles shall be considered for compensation which are caught in the video recording and are carrying a valid RTA permit of the route under consideration for closure. So in case a vehicle is found operating on one of the routes that is to be compensated but does not hold the legal permit to operate on that route, shall not be compensated for loss of operations on that route. The details regarding the documentary requirements are shown in Table 5.

7.3 Policy Communication with the Stakeholders

It is important to mention that the Transport & Mass Transit Department (TMTD, GoS) has not approved the draft Compensation Policy yet, so it is not advisable to communicate the stakeholders prematurely. Also Asian Development Bank (ADB) loan has not been approved yet, so it is not appropriate for the ODBM team to communicate the policy and engage the operators into any financial negotiations. The communication of the policy and the negotiations shall be initiated only once the loan is approved and the entire structure is prepared to deal with the disbursements. Any delays between the communication, negotiation and disbursement phase could allow the operators space to create unnecessary issues in the process.

Therefore, Outputs 2.1 B and 5.1 B (Negotiations With Existing Operators – Final, respectively for Red and Yellow Lines) are expected to be presented only in the Final version of Interim Report 3 subject to the approval of TMTD, GoS and loan agreement. However, the policy and engagement methodology has been developed and explained briefly below for each operator category.

7.3.1 Negotiations with the Transport Association:

The formation of the SPV and the fleet count shall allow the SMTA to initiate the process of negotiation with the Transport Ittehad and route owners. As explained earlier in the report, the dynamics of Karachi's transport industry are different from those of any other city of Pakistan. The influence of the informal sector is very strong and organized. The owners of the routes, an entity not covered under any legal framework, derive the policy and operational matters of the sector. They also represent the entire public transport sector and all its associated stakeholders as members of the Karachi Transport Ittehad (KTI). This association is an officially recognized representative body of the public transport sector of Karachi. The leading members of this organization are those who own routes as well as multiple buses.

Since this association holds sufficient degree of authority over the operations of the sector, any compensation that is to be offered to any of the stakeholders of the industry must be shared with the association first. Therefore the policy shall first be disclosed to the KTI. However, since the KTI is not amongst the list of those to be compensated, a conflict of interest may arise between the KTI and the affected route owners, who are to be offered compensation. Therefore it is recommended that the KTI should be requested to invite the owners of the affected route with them at policy disclosure sessions. Once the policy is disclosed to the KTI, one on one negations sessions with each of the route owners shall be conducted.

It is important to mention here that the purpose of engaging the KTI should not be to seek any approvals, but rather to present it as a gesture of respect for the association. Any unnecessary/unjustified interruptions or demands by the association or any of its members should be strongly rejected by the negotiation/communications team.

7.3.2 Negotiations with the Route Owners:

As explain in the earlier sections of the report, the most influential people in the entire sector are those who own/manage the route operations. These route owners are not covered under any legal framework of the transport industry. However due to their customary rights, they have earned a place in the compensation policy. The details regarding the policy are available in section 5 of this report.

The compensation offer to the route owner is based on total number of vehicles operating on that route at the time of compensation. The negotiation team is recommended to have the actual fleet sizes of each route before entering into negotiation. The fleet size count shall be based on the results of the video recordings and subsequent verifications by the RTA. In case the route owners accept the compensation offers, the case shall be forwarded to the SPV which shall conduct the financial transactions. Meanwhile, the negotiation teams shall reach out to the drivers, conductors and vehicle owners taking into confidence the owners of those routes.

One critical aspect of compensating the route owners is that fact that these owners do not hold any legal right of ownership of these route. And informal survey results suggest that quite a few of these routes have shared ownerships and stakes. Cases of claim from multiple beneficiaries for a single route may be expected in the process. Therefore it is recommended that the KTI be given the responsibility to nominate the owners of routes which are to be affected and become an official arbitrator in the process.

7.3.3 Negotiations with the Drivers and Conductors:

Only once the Karachi Transport Ittehad (KTI) is taken into confidence, the drivers and conductors of the affected route shall be approached for policy communication. The communication process shall require a team to visit each of the affected route's terminal and explain the policy to the drivers and conductors.

Even though the drivers and conductors are not to be given any financial compensation in the process, they will be encouraged to enlist themselves as candidates for the similar positions in the mass transit network. The positions may include that of the drivers, conductors, ticket collectors, security guards etc.

The interested applicants will be asked to register themselves at the SPVs coordination desk and submit the required documents.

Since the process of employment is the responsibility of the Vehicle Operating Company (VOC) of the mass transit network, the list of applicants shall be shared with the VOC. It is important to mention here that the “Vehicle Operating Company” will not be bound by the SMTA/TMTD to hire the listed applicants. However it will be encouraged to evaluate and accommodate as many of candidates from the existing industry as possible following the due course.

7.3.4 Negotiations with the Vehicle Owners

The vehicle owners are those who provide the critical financial capital to this sector. The industry’s socio-economic survey results revealed that approximately 27% vehicles are being driven by their owners. The remaining number of owners are not available at the terminals and therefore had to be approached and interviewed on phone calls during the socio-economic survey. The survey could engage less than 50% of the total vehicle owners. Therefore communicating this policy to the vehicle owners will be a challenging task again. This would not just require lot of time but also strong support from the route management team. Other problems expected in the process may include multiple claims of ownerships and similar disputes. So, the communications and negotiation team will have to be prepared to deal with such challenges.

Each interested owner will be asked to enlist him/herself at the enlistment desk and deposit the required set of documents. The collection officer shall maintain a checklist of documents against each application. In case an application has any shortcomings, a note of same shall be attached along the file. The application however shall not be moved to any department for validation until all the documents are submitted.

The applicant shall be contacted for all updates on the matters related to the application. Once a file is approved, the applicant shall be asked to bring the vehicle to the scrapping yard for inspection and evaluation. In case the applicant accepts with offered price, the transaction shall take place in accordance with the approved mechanism.

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUT 2.3 AND 5.3 – DRAFT CONTRACTS

BUS PROCUREMENT – ANNEX A – GENERAL CONDITIONS OF CONTRACT

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

Annex A
General Conditions of Contract

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Definitions

1.1 The following words and expressions shall have the meanings hereby assigned to them:

(a) "Contract" means the contract entered into between the Purchaser and the Supplier, together with the Contract Documents referred to therein, including all attachments, appendixes, and all documents incorporated by reference therein.

(b) "Contract Documents" means the documents listed in Clause 2 of the Contract, including any amendments thereto.

(c) "Contract Price" means the price payable to the Supplier as specified in the Contract, subject to such additions and adjustments thereto or deductions therefrom, as may be made pursuant to the Contract.

(d) "Day" means a calendar day.

(e) "Delivery" means the transfer of the Goods from the Supplier to the Purchaser in accordance with the terms and conditions set forth in the Contract.

(f) "Completion" means the fulfillment of the Related Services by the Supplier in accordance with the terms and conditions set forth in the Contract.

(g) "Eligible Countries" means the countries and territories eligible as listed in Annex F (*List of Eligible Countries*) to the Contract.

(h) "GCC" means the General Conditions of Contract.

(i) "Goods" means all of the commodities, raw material, machinery and equipment, and/or other materials that the Supplier is required to supply to the Purchaser under the Contract.

(j) "Purchaser's Country" is the country specified in the SCC.

(k) "Purchaser" means the entity purchasing the Goods and Related Services, as specified in the SCC (which expression shall include its successors-in-interest and permitted assigns).

(l) "Related Services" means the services incidental to the supply of the Goods, such as insurance, installation, training and initial maintenance and other similar obligations of the Supplier under the Contract.

(m) "SCC" means the Special Conditions of Contract.

(n) "Subcontractor" means any natural person, private or government entity, or a combination of the above, including its legal successors or permitted assigns, to whom any part of the Goods to be supplied or execution of any part of the Related Services is subcontracted by the Supplier.

(o) "Supplier" means a natural person, private or government entity, or a combination of the above, whose bid to perform the Contract has been accepted by the Purchaser and who is named as such in the Contract (which expression shall include its successors-in-interest and permitted assigns).

(p) "ADB" means the Asian Development Bank.

(q) "The Site," where applicable, means the place named in the SCC.

Contract Documents 1.2 Subject to the order of precedence set forth in the Contract, all documents forming the Contract (and all parts thereof) are intended to be correlative, complementary and mutually explanatory.

Fraud and Corruption 1.3 ADB's Anticorruption Policy requires borrowers (including beneficiaries of ADB-financed activity), as well as bidders, suppliers and contractors under ADB-financed contracts to observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, ADB

defines, for the purposes of this provision, the terms set forth below as follows:

(i) "corrupt practice" means the offering, giving, receiving, or soliciting, directly or indirectly, anything of value to influence improperly the actions of another party;

(ii) "fraudulent practice" means any act or omission, including a misrepresentation that knowingly or recklessly misleads or attempts to mislead a party to obtain a financial or other benefit or to avoid an obligation;

(iii) "coercive practice" means impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;

(iv) "collusive practice" means an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party;

(v) "obstructive practice" means (a) deliberately destroying, falsifying, altering, or concealing of evidence material to an ADB investigation; (b) making false statements to investigators in order to materially impede an ADB investigation; (c) failing to comply with requests to provide information, documents or records in connection with an Office of Anticorruption and Integrity (OAI) investigation; (d) threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or (e) materially impeding ADB's contractual rights of audit or access to information; and

(vi) "integrity violation" is any act which violates ADB's Anticorruption Policy, including (i) to (v) above and the following: abuse, conflict of interest, violations of ADB sanctions, retaliation against whistleblowers or witnesses, and other violations of ADB's Anticorruption Policy, including failure to adhere to the highest ethical standard.

will reject a proposal for award if it determines that the bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations in competing for the Contract;

will cancel the portion of the financing allocated to a contract if it determines at any time that representatives of the borrower or of a beneficiary of ADB-financing engaged in corrupt, fraudulent, collusive, coercive or obstructive practices or other integrity violations during the procurement or the execution of that contract, without the borrower having taken timely and appropriate action satisfactory to ADB to remedy the situation; and

will impose remedial actions on a firm or an individual, at any time, in accordance with ADB's Anticorruption Policy and Integrity Principles and Guidelines (both as amended from time to time), including declaring ineligible, either indefinitely or for a stated period of time, to participate[1] in ADB-financed, -administered, or -supported activities or to benefit from an ADB-financed, -administered, or -supported contract, financially or otherwise, if it at any time determines that the firm or individual has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations.

1.4 The Supplier shall permit ADB to inspect the Supplier's accounts and records relating to the performance of the Supplier and to have them audited by auditors appointed by ADB, if so required by ADB.

Interpretation

1.5 If the context so requires, the singular includes the plural and vice versa.

1.6 Incoterms

The meaning of any trade term and the rights and obligations of the parties thereunder shall be as prescribed by Incoterms.

EXW, CIF, CIP, and other similar terms, shall be governed by the rules prescribed in the current edition of Incoterms published by the International Chamber of Commerce at the date of the invitation for bids, or as specified in the SCC.

1.7 Entire Agreement

The Contract constitutes the entire agreement between the Purchaser and the Supplier and supersedes all and any communications, negotiations and agreements (whether written or oral) of the parties made prior to the date of the Contract.

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[1] *Whether as a Contractor, Subcontractor, Consultant, Manufacturer or Supplier, or Service Provider; or in any other capacity (different names are used depending on the particular Bidding Document).*

1.8 Amendment

No amendment or other variation of the Contract shall be valid unless it is in writing, is dated, expressly refers to the Contract and is signed by a duly authorized representative of each party to the Contract.

1.9 Non-waiver

(a) No relaxation, forbearance, delay or indulgence by either party to the Contract in enforcing any of the terms and conditions of the Contract or the granting of time by either party to the other shall prejudice, affect or restrict the rights of that party under the Contract, nor shall any waiver by either party of any breach of the Contract operate as a waiver of any subsequent or continuing breach of the Contract.

(b) Any waiver of a party's rights, powers or remedies under the Contract must be in writing, dated and signed by an authorized representative of the party granting such waiver, and must specify the right and the extent to which it is being waived.

1.10 Severability

If at any time any provision of the Contract is or becomes illegal, invalid or unenforceable in any respect under any law of any jurisdiction, neither the legality, validity or enforceability of the remaining provisions nor the legality, validity or enforceability of such provision under the law of any other jurisdiction will, in any way, be affected or impaired.

Language

1.11 The Contract as well as all correspondence and documents relating to the Contract exchanged by the Supplier and the Purchaser shall be written in the language specified in the SCC. Supporting documents and printed literature that are part of the Contract may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified in the SCC, in which case, for purposes of interpretation of the Contract, such translation shall govern.

1.12 The Supplier shall bear all costs of translation to the governing language and all risks of the accuracy of such translation.

Joint Venture

1.13 If the Supplier is a Joint Venture all of the parties shall be jointly and severally liable to the Purchaser for the fulfillment of the provisions of the Contract and shall designate one party to act as a leader with authority to bind the Joint Venture. The composition or the constitution of the Joint Venture shall not be altered without the prior consent of the Purchaser.

Eligibility

1.14 The Supplier and its Subcontractors shall have the nationality of an eligible country. A Supplier or Subcontractor shall be deemed to have the nationality of a country if it is a citizen or if it is constituted, incorporated or registered and operates in conformity with the provisions of the laws of that country.

1.15 All Goods and Related Services to be supplied under the Contract and financed by ADB shall have their origin in Eligible Countries. For the purpose of this Sub-clause, “country of origin” means the country where the goods are grown, mined, cultivated, produced, manufactured, or processed; or through manufacture, processing, or assembly, another commercially recognized article is created that differs substantially in its basic characteristics from its imported components.

Notices

1.16 Any notice given by one party to the other pursuant to the Contract shall be in writing to the address specified in the SCC. The term “in writing” means communicated in written form with proof of receipt.

1.17 A notice shall be effective when delivered or on the notice’s effective date, whichever is later.

Governing Law

1.18 The Contract shall be governed by and interpreted in accordance with the laws of the Purchaser’s country, unless otherwise specified in the SCC.

Settlement of Disputes

1.19 The Purchaser and the Supplier shall make every effort to resolve amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with the Contract.

1.20 If the parties fail to resolve such dispute or difference by direct informal negotiation within twenty-eight (28) days from the commencement of such negotiation, either party may require that the dispute be referred for resolution to the formal mechanisms specified in the SCC.

Scope of Supply

1.21 Subject to the SCC, the Goods and the Related Services to be supplied under the Contract shall be as specified in Annex C (*Schedule of Supply*) to the Contract.

1.22 Unless otherwise stipulated in the Contract, the scope of supply shall include all such items that are not specifically mentioned in the Contract but that can be reasonably inferred from the Contract as being required for attaining the Delivery of the Goods and the Completion of the Related Services, as if such items were expressly mentioned in the Contract.

Delivery

1.23 Subject to Sub-clause 33.1 of the GCC, the Delivery of the Goods and the Completion of the Related Services shall be in accordance with the delivery and completion schedule specified in Annex C (*Schedule of Supply*) to the Contract. The details of the shipping and other documents to be provided by the Supplier are specified in the SCC. Unless the Contract provides otherwise, title to the Goods or any part thereof delivered in accordance with the Contract shall vest in the Purchaser at time of delivery. Notwithstanding the foregoing, the Purchaser shall, after delivery, have the right to reject the Goods or any part thereof if the same do not comply with the Contract's requirements and this right shall survive any prior inspection, acceptance or test of parts or materials.

Supplier's Responsibilities

1.24 The Supplier shall supply all the Goods and the Related Services included in the scope of supply in accordance with Clause 11 (*Scope of Supply*) of the GCC and the delivery and completion schedule as per Clause 12 (*Delivery*) of the GCC.

Purchaser's Responsibilities

1.25 Whenever the supply of the Goods and the Related Services requires the Supplier to obtain permits, approvals and import and other licenses from local public authorities, the Purchaser shall, if so required by the Supplier, make its best effort to assist the Supplier in complying with such requirements in a timely and expeditious manner.

Contract Price

1.26 The Contract Price shall be as specified in the Contract subject to any additions and adjustments thereto, or deductions therefrom, as may be made pursuant to the Contract.

1.27 Prices charged by the Supplier for the Goods delivered and the Related Services performed under the Contract shall not vary from the prices quoted by the Supplier in its bid, with the exception of any price adjustments authorized in the SCC.

Terms of Payment

1.28 The Contract Price shall be paid as specified in the SCC.

1.29 The Supplier's request for payment shall be made to the Purchaser in writing accompanied by invoices describing, as appropriate, the Goods delivered and Related Services performed, and by the documents submitted pursuant to Clause 12 (*Delivery*) of the GCC, and upon fulfillment of all the obligations stipulated in the Contract.

1.30 Payments shall be made promptly by the Purchaser, no later than sixty (60) days after submission of the invoice or request for payment by the Supplier, and the Purchaser's acceptance thereof.

1.31 The currency or currencies in which payments shall be made to the Supplier under this Contract shall be specified in the SCC.

Taxes and Duties

1.32 For goods supplied from outside the Purchaser's country, the Supplier shall be entirely responsible for all taxes, stamp duties, license fees, and other such levies imposed outside the Purchaser's country.

1.33 For goods supplied from within the Purchaser's country, the Supplier shall be entirely responsible for all taxes, duties, license fees, etc., incurred until the Delivery of the Goods to the Purchaser.

1.34 If any tax exemptions, reductions, allowances or privileges may be available to the Supplier in the Purchaser's Country, the Purchaser shall use its best efforts to enable the Supplier to benefit from any such tax savings to the maximum allowable extent.

Performance Guarantee

1.35 The Supplier shall, within twenty-eight (28) days of the notification of the Contract award, provide the Performance Guarantee for the due performance of the Contract in the amounts and currencies specified in the SCC.

1.36 The proceeds of the Performance Guarantee shall be payable to the Purchaser as compensation for any loss resulting from the Supplier's failure to complete its obligations under the Contract.

1.37 The Performance Guarantee shall be denominated in the currencies of the Contract, or in a freely convertible currency acceptable to the Purchaser, and shall be in one of the forms stipulated by the Purchaser in the SCC, or in another form acceptable to the Purchaser.

1.38 The Performance Guarantee shall be discharged by the Purchaser and returned to the Supplier not later than twenty-eight (28) days following the date of completion of the Supplier's performance obligations under the Contract, including any warranty obligations, unless specified otherwise in the SCC.

Copyright

1.39 The copyright in all drawings, documents, and other materials containing data and information furnished to the Purchaser by the Supplier shall remain vested in the Supplier, or, if they are furnished to the Purchaser directly or through the Supplier by any third party, including suppliers of materials, the copyright in such materials shall remain vested in such third party.

Confidential Information

1.40 The Purchaser and the Supplier shall keep confidential and shall not, without the written consent of the other party hereto, divulge to any third party any documents, data, or other information furnished directly or indirectly by the other party hereto in connection with the Contract, whether such information has been furnished prior to, during or following completion or termination of the Contract. Notwithstanding the above, the Supplier may furnish to its Subcontractor such documents, data, and other information it receives from the Purchaser to the extent required for the Subcontractor to perform its work under the Contract, in which event the Supplier shall obtain from such Subcontractor an undertaking of confidentiality similar to that imposed on the Supplier under this Clause 20.

1.41 The Purchaser shall not use such documents, data, and other information received from the Supplier for any purposes unrelated to the Contract. Similarly, the Supplier shall not use such documents, data, and other information received from the Purchaser for any purpose other than the design, procurement, or other work and services required for the performance of the Contract.

1.42 The obligation of a party under Sub-clauses 20.1 and 20.2 above, however, shall not apply to information that

(a) the Purchaser or Supplier needs to share with ADB or other institutions participating in the financing of the Contract;

(b) now or hereafter enters the public domain through no fault of that party;

(c) can be proven to have been possessed by that party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other party; or

(d) otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality.

1.43 The above provisions of this Clause 20 shall not in any way modify any undertaking of confidentiality given by either of the parties hereto prior to the date of the Contract.

1.44 The provisions of this Clause 20 shall survive completion or termination, for whatever reason, of the Contract.

Subcontracting

1.45 The Supplier shall notify the Purchaser in writing of all subcontracts awarded under the Contract if not already specified in the bid. Subcontracting shall in no event relieve the Supplier from any of its obligations, duties, responsibilities, or liability under the Contract.

1.46 Subcontractors shall comply with the provisions of Clauses 3 (*Fraud and Corruption*), 7 (*Eligibility*) and 20 (*Confidential Information*) of the GCC.

Specifications and Standards

1.47 Technical Specifications and Drawings

(a) The Supplier shall ensure that the Goods and the Related Services comply with the technical specifications and other provisions of the Contract.

(b) The Supplier shall be entitled to disclaim responsibility for any design, data, drawing, specification or other documents, or any modification thereof provided or designed by or on behalf of the Purchaser, by giving a notice of such disclaimer to the Purchaser.

(c) The Goods and the Related Services supplied under this Contract shall conform to the standards described in Annex C (*Schedule of Supply*) to the Contract and, when no applicable standard is mentioned, the standard shall be equivalent or superior to the official standards whose application is appropriate to the country of origin of the Goods.

1.48 Wherever references are made in the Contract to codes and standards in accordance with which it shall be executed, the edition or the revised version of such codes and standards shall be those specified in Annex C (*Schedule of Supply*) to the Contract. During Contract execution, any changes in any such codes and standards shall be applied only after approval by the Purchaser and shall be treated in accordance with Clause 33 (*Change Orders and Contract Amendments*) of the GCC.

Packing and Documents

1.49 The Supplier shall provide such packing of the Goods as required to prevent their damage or deterioration during transit to their final destination, as indicated in the Contract. During transit the packing shall be sufficient to withstand, without limitation, rough handling and exposure to extreme temperatures, salt and precipitation and open storage. Packing case size and weights shall take into consideration, where appropriate, the remoteness of the final destination of the Goods and the absence of heavy handling facilities at all points in transit.

1.50 The packing, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract, including additional requirements, if any, specified in the SCC, and in any other instructions ordered by the Purchaser.

Insurance

1.51 Unless otherwise specified in the SCC, the Goods supplied under the Contract shall be fully insured, in a freely convertible currency from an eligible country, against loss or damage incidental to manufacture or acquisition, transportation, storage, and delivery, in accordance with the applicable Incoterms or in the manner specified in the SCC.

Transportation

1.52 Unless otherwise specified in the SCC, obligations for transportation of the Goods shall be in accordance with the Incoterms specified in Annex C (*Schedule of Supply*) to the Contract.

Inspections and Tests

1.53 The Supplier shall at its own expense and at no cost to the Purchaser carry out all such tests and/or inspections of the Goods and Related Services as are specified in Annex C (*Schedule of Supply*) to the Contract.

1.54 The inspections and tests may be conducted on the premises of the Supplier or its Subcontractor, at point of delivery, and/or at the final destination of the Goods, or in another place in the Purchaser's country as specified in the SCC. Subject to Sub-clause 26.3 below, if conducted on the premises of the Supplier or its Subcontractor, all reasonable facilities and assistance, including access to drawings and production data, shall be furnished to the inspectors at no charge to the Purchaser.

1.55 The Purchaser or its designated representative shall be entitled to attend the tests and/or inspections referred to in Sub-clause 26.2 above, provided that the Purchaser bear all of its own costs and expenses incurred in connection with such attendance including, but not limited to, all traveling and board and lodging expenses.

1.56 Whenever the Supplier is ready to carry out any such test and inspection, it shall give a reasonable advance notice, including the place and time, to the Purchaser. The Supplier shall obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Purchaser or its designated representative to attend the test and/or inspection.

1.57 The Purchaser may require the Supplier to carry out any test and/or inspection not required by the Contract but deemed necessary to verify that the characteristics and performance of the Goods comply with the technical specifications, codes, and standards under the Contract, provided that the Supplier's reasonable costs and expenses incurred in the carrying out of such test and/or inspection shall be added to the Contract Price. Further, if such test and/or inspection impedes the progress of manufacturing and/or the Supplier's performance of its other obligations under the Contract, due allowance will be made in respect of the delivery dates and completion dates and the other obligations so affected.

1.58 The Supplier shall provide the Purchaser with a report of the results of any such test and/or inspection.

1.59 The Purchaser may reject any Goods or any part thereof that fail to pass any test and/or inspection or do not conform to the specifications. The Supplier shall either rectify or replace such rejected Goods or parts thereof or make alterations necessary to meet the specifications at no cost to the Purchaser, and shall repeat the test and/or inspection, at no cost to the Purchaser, upon giving a notice pursuant to Sub-clause 26.4 above.

1.60 The Supplier agrees that neither the execution of a test and/or inspection of the Goods or any part thereof, nor the attendance by the Purchaser or its representative, nor the issue of any report pursuant to Sub-clause 26.6 above, shall release the Supplier from any warranties or other obligations under the Contract.

Liquidated Damages

1.61 Except as provided under Clause 32 (*Force Majeure*) of the GCC, if the Supplier fails to deliver any or all of the Goods or perform the Related Services within the period specified in the Contract, the Purchaser may without prejudice to all its other remedies under the Contract, deduct from the Contract Price, as liquidated damages, a sum equivalent to the percentage specified in the SCC of the Contract Price for each week or part thereof of delay until actual delivery or performance, up to a maximum deduction of the percentage specified in the SCC. Once the maximum is reached, the Purchaser may terminate the Contract pursuant to Clause 35 (*Termination*) of the GCC.

Warranty

1.62 The Supplier warrants that all the Goods are new, unused, and of the most recent or current models, and that they incorporate all recent improvements in design and materials, unless provided otherwise in the Contract.

1.63 Subject to Sub-clause 22.1 of the GCC, the Supplier further warrants that the Goods shall be free from defects arising from any act or omission of the Supplier or arising from design, materials, and workmanship, under normal use in the conditions prevailing in the country of final destination. The Purchaser shall not be obliged to pay for non-conforming Goods, and the Supplier shall be responsible for their removal and replacement with the Goods that conform to the requirements of the Contract.

1.64 Unless otherwise specified in the SCC, the warranty shall remain valid for twelve (12) months after the Goods, or any portion thereof as the case may be, have been delivered to and accepted at the final destination indicated in the SCC, or for eighteen (18) months after the date of shipment or loading in the country of origin, whichever period concludes earlier.

1.65 The Purchaser shall give a notice to the Supplier stating the nature of any such defects together with all available evidence thereof, promptly following the discovery thereof. The Purchaser shall provide all reasonable opportunity for the Supplier to inspect such defects.

1.66 Upon receipt of such notice, the Supplier shall, within the period specified in the SCC, expeditiously repair or replace the defective Goods or parts thereof, at no cost to the Purchaser.

1.67 If having been notified, the Supplier fails to remedy the defects within the period specified in the SCC, the Purchaser may proceed to take within a reasonable period such remedial action as may be necessary at the Supplier's risk and expense and without prejudice to any other rights which the Purchaser may have against the Supplier under the law and the Contract.

Patent Indemnity

1.68 The Supplier shall, subject to the Purchaser's compliance with Sub-clause 29.2 of the GCC, indemnify and hold harmless the Purchaser and its employees and officers from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of any nature, including attorney's fees and expenses, which the Purchaser may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property rights registered or otherwise existing at the date of the Contract by reason of

(a) the installation of the Goods by the Supplier or the use of the Goods in the country where the Site is located; and

(b) the sale in any country of the products produced by the Goods.

Such indemnity shall not cover any use of the Goods or any part thereof other than for the purpose indicated by or to be reasonably inferred from the Contract, neither any infringement resulting from the use of the Goods or any part thereof, or any products produced thereby in association or combination with any other equipment, plant, or materials not supplied by the Supplier, pursuant to the Contract.

1.69 If any proceedings are brought or any claim is made against the Purchaser arising out of the matters referred to in Sub-clause 29.1 above, the Purchaser shall promptly give the Supplier a notice thereof, and the Supplier may at its own expense and in the Purchaser's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim.

1.70 If the Supplier fails to notify the Purchaser within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Purchaser shall be free to conduct the same on its own behalf.

1.71 The Purchaser shall, at the Supplier's request, provide all available assistance to the Supplier in conducting such proceedings or claim, and shall be reimbursed by the Supplier for all reasonable expenses incurred in so doing.

1.72 The Purchaser shall indemnify and hold harmless the Supplier and its employees, officers, and Subcontractors from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of any nature, including attorney’s fees and expenses, which the Supplier may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property right registered or otherwise existing at the date of the Contract arising out of or in connection with any design, data, drawing, specification, or other documents or materials provided or designed by or on behalf of the Purchaser.

Limitation of Liability

30.1 Except in cases of gross negligence or willful misconduct,

(a) neither party shall be liable to the other party for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Supplier to pay liquidated damages to the Purchaser or to any right of the Purchaser to impose the Contract Price deductions on the Supplier; and

(b) the aggregate liability of the Supplier to the Purchaser, whether under the Contract, in tort, or otherwise, shall not exceed the amount specified in the SCC, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment, or to any obligation of the Supplier to indemnify the Purchaser with respect to patent infringement.

Change in Laws and Regulations

1.73 Unless otherwise specified in the Contract, if after the date of the invitation for bids, any law, regulation, ordinance, order or bylaw having the force of law is enacted, promulgated, abrogated, or changed in the place of the Purchaser’s country where the Site is located (which shall be deemed to include any change in interpretation or application by the competent authorities) that subsequently affects the delivery date and/or the Contract Price, then such delivery date and/or Contract Price shall be correspondingly increased or decreased, to the extent that the Supplier has thereby been affected in the performance of any of its obligations under the Contract. Notwithstanding the foregoing, such additional or reduced cost shall not be separately paid or credited if the same has already been accounted for in the price adjustment provisions where applicable, in accordance with Clause 15 (*Contract Price*) of the GCC.

Force Majeure

1.74 The Supplier shall not be liable for forfeiture of its Performance Guarantee, liquidated damages or termination for default if and to the extent that its delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.

1.75 For the purposes of this Clause, “Force Majeure” means an exceptional event or circumstance beyond the control of the Supplier that is not reasonably foreseeable, is unavoidable, and its origin is not due to negligence or lack of care on the part of the Supplier. Such events may include, but not be limited to, war, hostilities (whether war be declared or not), invasion or act of foreign enemies, rebellion, terrorism, revolution, military or usurped power or civil war, riot, commotion, natural catastrophes such as earthquake, hurricane, floods.

1.76 If an event of Force Majeure arises, the Supplier shall promptly notify the Purchaser in writing of such even/circumstance and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

Change Orders and Contract Amendments

1.77 The Purchaser may at any time order the Supplier through a notice in accordance with Clause 8 (*Notices*) of the GCC, to make changes within the general scope of the Contract in any one or more of the following:

(a) drawings, designs, or specifications, where the Goods to be furnished under the Contract are to be specifically manufactured for the Purchaser;

(b) the method of shipment or packing;

(c) the place of delivery; and

(d) the Related Services to be provided by the Supplier.

1.78 If any such change causes an increase or decrease in the cost of, or the time required for, the Supplier's performance of any provisions under the Contract, an equitable adjustment shall be made in the Contract Price or in the delivery and completion schedule, or both, and the Contract shall accordingly be amended. Any claims by the Supplier for adjustment under this Clause must be asserted within twenty-eight (28) days from the date of the Supplier's receipt of the Purchaser's change order.

1.79 Prices to be charged by the Supplier for any Related Services that might be needed but which were not included in the Contract shall be agreed upon in advance by the parties and shall not exceed the prevailing rates charged to other parties by the Supplier for similar services.

Extensions of Time

1.80 If at any time during performance of the Contract, the Supplier or its Subcontractors encounter conditions impeding timely delivery of the Goods or completion of the Related Services pursuant to Clause 12 (*Delivery*) of the GCC, the Supplier shall promptly notify the Purchaser in writing of the delay, its likely duration, and its cause. As soon as practicable after receipt of the Supplier's notice, the Purchaser shall evaluate the situation and may at its discretion extend the Supplier's time for performance, in which case the extension shall be ratified by the parties by amendment of the Contract.

1.81 Except in case of Force Majeure, as provided under Clause 32 (*Force Majeure*) of the GCC, a delay by the Supplier in the performance of its Delivery and Completion obligations shall render the Supplier liable to the imposition of liquidated damages pursuant to Clause 27 of the

GCC, unless an extension of time is agreed upon, pursuant to Sub-clause 34.1 above.

Termination

1.82 Termination for Default

(a) The Purchaser, without prejudice to any other remedies for breach of the Contract, by a notice of default sent to the Supplier, may terminate the Contract in whole or in part:

(i) if the Supplier fails to deliver any or all of the Goods and/or perform the Related Services within the period specified in the Contract, or within any extension thereof granted by the Purchaser pursuant to Clause 34 (*Extensions of Time*) of the GCC; or

(ii) if the Supplier commits a material breach of this Contract and fails to remedy the breach within ten (10) days after receipt from the Purchaser of a notice calling upon it to do so; or

(iii) if the Supplier fails to provide and maintain the Performance Guarantee; or

(iv) if the Supplier, in the judgment of the Purchaser has engaged in fraud and corruption, as defined in Clause 3 (Fraud and Corruption) of the GCC, in competing for or in executing the Contract.

(b) In the event the Purchaser terminates the Contract in whole or in part, pursuant to Sub-clause 35.1(a) above, the Purchaser may procure, upon such terms and in such manner as it deems appropriate, Goods or Related Services similar to those undelivered or not performed, and the Supplier shall be liable to the Purchaser for any additional costs for such similar Goods or Related Services. However, the Supplier shall continue performance of the Contract to the extent not terminated.

1.83 Termination for Insolvency

The Purchaser may at any time terminate the Contract by giving a notice to the Supplier if the Supplier becomes bankrupt or otherwise insolvent. In such event, termination will be without compensation to the Supplier, provided that such termination will not prejudice or affect any right of action or remedy that has accrued or will accrue thereafter to the Purchaser.

1.84 Termination for Convenience

(a) The Purchaser, by a notice sent to the Supplier, may terminate the Contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that termination is for the Purchaser’s convenience, the extent to which performance of the

Supplier under the Contract is terminated, and the date upon which such termination becomes effective.

(b) The Goods that are complete and ready for shipment within twenty-eight (28) days after the Supplier's receipt of the notice of termination shall be accepted by the Purchaser at the Contract terms and prices. For the remaining Goods, the Purchaser may elect

(i) to have any portion completed and delivered at the Contract terms and prices; and/or

(ii) to cancel the remainder and pay to the Supplier an agreed amount for partially completed Goods and Related Services and for materials and parts previously procured by the Supplier.

Assignment

1.85 Neither the Purchaser nor the Supplier shall assign, in whole or in part, their obligations under this Contract, except with prior written consent of the other party to the Contract.

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 – DRAFT CONTRACTS

BUS PROCUREMENT – ANNEX B – SPECIAL CONDITIONS OF CONTRACT

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

Annex B
Special Conditions of Contract

The following Special Conditions of Contract (SCC) shall supplement the General Conditions of Contract (GCC). In the event of any conflict between the provisions of the SCC and the provisions of the GCC, the provisions of the SCC shall prevail.

GCC 1.1(i)	The following text is added to Sub-clause 1.1(i) of the GCC: A detailed list of the Goods and their description are specified in Annex C (*Schedule of Supply*) to the Contract.
GCC 1.1(j)	The Purchaser's country is Islamic Republic of Pakistan.
GCC 1.1(k)	The Purchaser is [*insert complete name of the Purchaser*].
GCC 1.1(l)	The text of Sub-clause 1.1(l) of the GCC is deleted and replaced with the following text: "Related Services" means the services incidental to the supply of the Goods, such as insurance, vehicle maintenance supervision, maintenance training program, driver training program, vehicle homologation, registration and licensing, costs of transportation of the Goods and other similar obligations of the Supplier under the Contract. A detailed list of the Related Services and their description are specified in Annex C (*Schedule of Supply*) to the Contract.
GCC 1.1(o)	The Supplier is [*insert complete name of the Supplier*].
GCC 1.1 (q)	The Site is [*insert complete address*].
GCC 1.1 (r)	The following text is added to Sub-clause 1.1 of the GCC: (r) "The Vehicle Operator(s)" means (a) third-party vehicle operating company(ies) hired by the Purchaser for providing the BRT vehicle operations, which shall act as the vehicle operator(s) on behalf of the Purchaser wherever appearing in this contract. All the correspondence related to the Vehicle Operator(s) shall be addressed to the Purchaser.
GCC 4.2 (b)	The version of Incoterms shall be Incoterms 2010.
GCC 5.1	The language shall be English. The language for translation of supporting documents and printed literature shall be English.
GCC 8.1	For notices, the Purchaser's address shall be:

	Attention: [*insert complete name of the Purchaser*] Address: [*insert complete address*] Email: [*insert email*] For notices, the Supplier's address shall be: Attention: [*insert complete name of the Supplier*] Address: [*insert complete address*] Email: [*insert email*]
GCC 9.1	The governing law shall be the law of the Islamic Republic of Pakistan.
GCC 10.2	The formal mechanism for the resolution of disputes shall be: In case of a domestic Supplier, arbitration shall be carried out in accordance with the rules and provisions of Arbitration Act, 1940 of the Islamic Republic of Pakistan. The place of arbitration shall be "Islamabad, Islamic Republic of Pakistan." In case of a foreign Supplier, arbitration shall be carried out in accordance with the Rules of Arbitration of the International Chamber of Commerce. The place of arbitration shall be as mutually agreed between the contracting parties or in accordance with the Rules of Arbitration of the International Chamber of Commerce.
GCC 11.1	The scope of supply shall be specified in Annex C (*Schedule of Supply*) to the Contract. [Note: At the time of awarding the Contract, the Purchaser shall specify any change in the scope of supply with respect to Annex C (*Schedule of Supply*) to the Contract. Such changes may be required, for instance, if the quantities of Goods and/or Related Services are increased or decreased at the time of award.]
GCC 12.1	The shipping and other documents to be provided by the Supplier shall be: For the Goods supplied from abroad as per Incoterm CIP: Upon shipment, the Supplier shall notify the Purchaser and the respective insurance company by telex or fax of the full details of the shipment, including contract number, description of the Goods, quantity, the vessel, the bill of lading number and date, port of loading, date of shipment, port of discharge, etc. The Supplier shall send the following documents to the Purchaser, with a copy to the respective insurance company: (a) three (3) copies of the Supplier's invoice showing the description of the Goods, their quantity, unit price, and total amount; (b) one (1) original and two (2) copies of the negotiable, clean, on-board bill of lading marked "freight prepaid" and two (2) copies of non-negotiable bill of lading; (c) three (3) copies of the packing list identifying contents of each package; (d) insurance certificate; (e) manufacturer's or Supplier's warranty certificate;

	(f) inspection certificate issued by the nominated inspection agency and the Supplier's factory inspection report; and (g) certificate of origin. The Purchaser shall receive the above documents at least one (1) week before arrival of the Goods at the port or place of arrival and, if not received, the Supplier will be responsible for any consequential expenses. For the Goods from within the Purchaser's country as per Incoterm EXW: Upon delivery of the Goods to the transporter, the Supplier shall notify the Purchaser and send the following documents to the Purchaser: (a) three (3) copies of the Supplier's invoice showing the description of the Goods, their quantity, unit price, and total amount; (b) delivery note, railway receipt or truck/trailer receipt; (c) manufacturer's or Supplier's warranty certificate; (d) inspection certificate issued by the nominated inspection agency and the Supplier's factory inspection report; and (e) certificate of origin. The Purchaser shall receive the above documents before the arrival of the Goods and, if not received, the Supplier will be responsible for any consequential expenses.
GCC 13.1	The following text is added to Sub-clause 13.1 of the GCC: The Supplier shall obtain the following approvals from the Purchaser during the term of the Contract. Goods Stage 1: The Supplier shall submit the conceptual design of the vehicles for the approval of the Purchaser within fourteen (14) days of the signing of the Contract. The Purchaser shall respond within fourteen (14) days of receiving the request for approval. [Production of the first full unit at the manufacturer's facility shall be based on the conceptual design.] Stage 2: The Supplier shall submit the detailed design for the approval of the Purchaser within fourteen (14) days of the Purchaser's visit to the manufacturer's/Supplier's facility and inspection of the first full unit at the factory. The Purchaser shall respond within the fourteen (14) days of receiving the request for approval. Stage 3: Within fourteen (14) days of the approval of the detailed design of the vehicles, the Supplier shall seek concurrence from the Purchaser for the full production authorization as per agreed schedule of supply. The Purchaser shall respond within fourteen (14) days of receiving the request for approval. Stage 4. Within twenty-eight (28) days of the Delivery of the Goods to the Site, the Supplier shall obtain vehicle homologation, registration, and licensing from the responsible entities. Stage 5: Within ten (10) days of the vehicles receiving vehicle homologation, registration and licensing, the Supplier shall obtain Goods delivery and acceptance

	from the Purchaser. The Purchaser shall respond within twenty-eight (28) days of receiving the request for approval. The Supplier's request(s) shall be deemed approved by the Purchaser if the Purchaser fails to provide response to the request of the Supplier within the period mentioned above. Any approval mentioned herein above or elsewhere in the Contract shall not relieve the Supplier from its contractual and legal obligations neither shall it shift nor share the responsibility of the Supplier to the Purchaser. Related Services The Supplier shall share the content of the driver training program and the maintenance training program with the Purchaser twenty-eight (28) days prior to the commencement of the relevant program(s). The Purchaser shall provide comments, if any, within fourteen (14) days of receiving the relevant content. The Supplier may proceed with the scheduled training if the Purchaser fails to provide response or has no comments on the content of training within the period mentioned above. Review of the documents/content of the trainings mentioned herein above or elsewhere in the Contract shall not relieve the Supplier from its contractual and legal obligations neither shall it shift nor share the responsibility of the Supplier to the Purchaser.
GCC 15.2	The price adjustments shall be: Not Applicable.
GCC 16.1	The Contract Price shall be paid in the following order: For the Goods supplied from outside the Purchaser's country: (a) Advance Payment: Twenty (20) percent of the Contract Price shall be paid by the Purchaser to the Supplier within twenty-eight (28) days after signing of the Contract. Such payment shall be made provided the Supplier presents a request for payment accompanied by the Advance Payment Security. The Advance Payment Security shall (i) be in the form of a bank guarantee (substantially in the form prescribed by Annex E (*Advance Payment Security*) to the Contract), (ii) be provided for an amount equal to the amount of the advance payment, and (iii) remain valid until the Goods are delivered. (b) On Shipment: Forty (40) percent of the total or pro rata Contract Price (CIP amount) shall be paid by the Purchaser to the Supplier upon submission of the documents specified in Sub-clause 12.1 of the SCC. Such payment shall be made in relation to the Goods shipped through an irrevocable confirmed letter of credit opened in favor of the Supplier in a bank in its country under the ADB commitment procedure. (c) On Delivery: Twenty (20) percent of the total or pro rata Contract Price (CIP amount) shall be paid by the Purchaser to the Supplier upon Delivery of the Goods to the Site. (d) On Acceptance: Ten (10) percent of the total or pro rata Contract Price (CIP amount) shall be paid by the Purchaser to the Supplier within twenty-eight (28)

days after the receipt of the Goods at the Site. Such payment shall be made upon submission of a claim supported by the acceptance certificate issued by the Purchaser.

(e) On Completion of Supplier’s performance obligations under the Contract: Ten (10) percent of the total or pro rata Contract Price (CIP amount) shall be paid by the Purchaser to the Supplier within twenty-eight (28) days after the completion of the Supplier’s performance obligations under the terms of the GCC and the SCC (including Sub-clause 18.4 of the SCC). Such payment shall be made upon submission of a claim supported by the certificate of completion of warranty and maintenance supervisión period and other contractual/ technical requirements issued by the Purchaser.

For the Goods supplied from within the Purchaser’s country:

(a) Advance Payment: Twenty (20) percent of the Contract Price shall be paid by the Purchaser to the Supplier within twenty-eight (28) days after signing of the Contract. Such payment shall be made provided the Supplier presents a request for payment accompanied by the Advance Payment Security. The Advance Payment Security shall (i) be in the form of a bank guarantee (substantially in the form prescribed by Annex E (*Advance Payment Security*) to the Contract) (ii) be provided for an amount equal to the amount of the advance payment, and (iii) remain valid until the Goods are delivered.

(b) On Cargo: Forty (40) percent of the total or pro rata Contract Price (EXW amount) shall be paid by the Purchaser to the Supplier upon submission of the documents specified in Clause 12.1 of the SCC. Such payment shall be made in relation to the Goods transported through an irrevocable confirmed letter of credit opened in favor of the Supplier in a bank in its country under the ADB commitment procedure.

(c) On Delivery: Twenty (20) percent of the total or pro rata Contract Price (EXW amount) shall be paid by the Purchaser to the Supplier upon Delivery of the Goods to the Site.

(d) On Acceptance: Ten (10) percent of the total or pro rata Contract Price (EXW amount) shall be paid by the Purchaser to the Supplier within twenty-eight (28) days after the receipt of the Goods at the Site. Such payment shall be made upon submission of a claim supported by the acceptance certificate issued by the Purchaser. €(e) On Completion of Supplier’s Performance Obligation: Ten (10) percent of the total or pro rata Contract Price (EXW amount) shall be paid by the Purchaser to the Supplier within twenty-eight (28) days after the completion of the Supplier’s performance obligations under the terms of the GCC and SCC (including Sub-clause 18.4 of the SCC). Such payment shall be made upon submission of a claim supported by the certificate of completion of warranty and maintenance supervision period and other contractual/ technical requirements issued by the Purchaser.

Price schedule for the Related Services to be offered from outside and within the Purchaser’s country:

Maintenance Training Program and Driver Training Program

The terms of payment shall be:

	(a) Eighty (80) percent of the total or pro rata Contract Price shall be paid by the Purchaser to the Supplier within twenty-eight (28) days after the Completion. (b) Twenty (20) percent of the total or pro rata Contract Price shall be paid by the Purchaser to the Supplier within twenty-eight (28) days after the completion of the Supplier's performance obligations under the terms of the GCC and SCC (including Sub-clause 18.4 of the SCC). Such payment shall be made upon submission of a claim supported by the certificate of completion of warranty and maintenance supervision period and other contractual/ technical requirements issued by the Purchaser. Vehicle Maintenance Supervision Services The terms of payment shall be: (a) The Contract Price shall be paid by the Purchaser to the Supplier on a quarterly basis at the monthly rate stipulated in the Contract[1]. Such payments shall be made within twenty-eight (28) days after the submission of a claim with a certificate from the Purchaser confirming the Purchaser's satisfaction with the services during the relevant period. (b) The Purchaser shall retain ten (10) percent from the payable amount on account of vehicle maintenance supervision services until the completion of the Supplier's performance obligations under the terms of the GCC and the SCC (including Sub-clause 18.4 of the SCC). The Purchaser shall release the retained amounts within twenty eight (28) days after the completion of the Supplier's performance obligations upon submission of a claim supported by the certificate of completion of warranty and maintenance supervision period and other contractual/ technical requirements issued by the Purchaser.[2]
GCC 16.4	The currencies in which payments shall be made to the Supplier are as specified in the bid submitted by the Supplier and accepted by the Purchaser.
GCC 17.1	The following text is added to Sub-clause 17.1 of the GCC: The Purchaser shall also be responsible for clearance of goods/materials from the port in the Purchaser's country and shall pay all associated customs and import duties.
GCC 18.1	The Supplier shall provide the Performance Guarantee equal to ten (10) percent of the Contract Price. The Performance Guarantee shall be denominated in the currencies of the Contract Price.
GCC 18.3	The Performance Guarantee acceptable to the Purchaser shall be a bank guarantee issued by a reputable bank located outside the Purchaser's country or

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[1] ***DWF comment**: Please note that the relevant breakdown of monthly rates and the Contract Price for the Goods and (separately) for the Related Services shall be included in the Contract.*

[2] ***DWF comment**: We understand the Related Services also include (i) completion of full vehicle homologation, registration and licensing for BRT vehicles; and (ii) costs of inland transportation and associated insurance for supply of the vehicles to the Site. If our understanding is correct, please provide the terms of payment for those services, if applicable.*

	a reputable local bank, substantially in the form prescribed by Annex D (*Performance Guarantee*) to the Contract. In case the institution issuing the Performance Guarantee is located outside the country of the Purchaser, it shall have a correspondent financial institution located in the country of the Purchaser to make it enforceable. The Performance Guarantee of a Joint Venture shall be in the name of the Joint Venture.
GCC 18.4	The discharge of the Performance Guarantee shall take place pursuant to Sub-clause 18.4 of the GCC. The completion of the Supplier's performance obligations under the Contact shall occur after the completion of the warranty and maintenance supervision period and after the Completion of the maintenance training program and the driver training program. The Performance Guarantee shall be reduced to [five (5) percent of the Contract Price][3] after the Delivery and acceptance of the Goods and the Completion of the maintenance training program and the driver training program in order to cover the Supplier's warranty obligations in accordance with Sub-clause 28.3 of the GCC.
SCC 22.3	Sub-clause 22.3 is added to Clause 22 (*Specifications and Standards*) of the GCC: 22.3 All Goods supplied under the Contract shall comply with all national, provincial and local legislation, regulations or by-laws as well as with the prevailing relevant national standards. As a professional supplier, the Supplier is expected to be fully familiarized with the legal requirements for the proposed types of public transport vehicles in the given national context. Any shortcomings or deficiencies in respect of meeting the applicable standards shall be rectified by the Supplier at its own cost without any liability of the Purchaser. The Purchaser shall, at the Supplier's request, provide all available assistance to the Supplier to ensure compliance with this provision.
GCC 24.1	The Supplier shall insure the Goods in the amount equal to 110 (one hundred and ten) percent of the CIP or EXW Contract Price of the Goods from "Warehouse" to "Warehouse" on "All Risks" basis, including theft, fire, riots, war risks, strikes and road accidents.
GCC 25.1	Obligations for transportation of the Goods shall be in accordance with Incoterms 2010. For the Goods to be supplied from within the Purchaser's country, the EXW Contract Price shall include the cost of transportation from the manufacturer's/Supplier's premises to the Site.

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[3] ***DWF comment**: TBC.*

GCC 26.2	The inspections and tests shall be carried out at the following times or milestones and places : Goods: All vehicles Type of Test: Vehicle running and basic operations test. The Supplier shall provide a certificate confirming compliance of the first full unit with the required features/criteria upon the inspections and tests carried out at the Supplier's premises. Time or Milestone: Upon Delivery Address: [*insert complete address*] Country: Karachi, Pakistan In addition to the above, the Purchaser shall conduct the inspections and tests of the first full unit [both vehicle types (12-meter and 18-meter BRT vehicles)][4] in accordance with the delivery schedule stipulated in Annex C (*Schedule of Supply*) to the Contract. The Supplier shall arrange for all the necessary assistance for the tests and inspections at the manufacturer's premises. The Supplier shall also arrange boarding, lodging and travelling to the Supplier's premises and return to the Purchaser's place for the Purchaser's team comprising five (5) persons.
GCC 26.3	The text of Sub-clause 26.3 of the GCC is deleted and replaced with the following text: The Purchaser or its designated representative shall be entitled to attend the tests and/or inspections referred to in Sub-clause 26.2 of the GCC.
GCC 27.1	The text of sub-clause 27.1 of the GCC is deleted and replaced with the following text: Except as provided under Clause 32 (*Force Majeure*) of the GCC, if the Supplier fails to deliver any or all of the Goods or perform the Related Services within the period specified in the Contract, the Supplier shall pay delay damages to the Purchaser for this default. These delay damages shall be the sum of [USD 650 (six hundred and fifty)][5] per day per one item of Goods/Related Services for each day of the delay or noncompliance with respect to the delivery of the Goods and the Related Services until actual delivery or performance. The Supplier acknowledges that the delay damages imposed by the Purchaser shall be without prejudice to any other remedies under the Contract. Payment of such damages shall not relieve the Supplier from its obligations or responsibilities under the Contract. The Supplier also acknowledges that the delay damages are in all respects fair and reasonable, represent a genuine pre-estimate of the losses, damages and expenses likely to be suffered or incurred by the Purchaser arising out of a breach by the Supplier of its obligations under the Contract, and are not penalty.

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[4] ***DWF comment**: TBC if the fleet will include any other types of vehicles (e.g., 8.5 or 9-meter vehicles).*

[5] ***DWF comment**: TBC.*

	The Purchaser shall be entitled to (i) payment of delay damages immediately after the relevant time for the delivery of the Goods/Related Services has passed; (ii) issue invoices for payment of delay damages to the Supplier on a weekly basis for all such delay damages accrued up to and including the date of each such invoice; and (iii) set off delay damages from any payment due to the Supplier under the Contract. The maximum amount of the delay damages shall be [ten (10) percent of the Contract Price][6]. Once the maximum is reached, the Purchaser may terminate the Contract pursuant to Sub-clause 35 of the GCC. In the event that the provisions for payment of delay damages are held to be unenforceable in whole or in part, the Purchaser shall be entitled to recover any losses it suffers as a result of the Supplier's breach as general damages for breach of contract. Any such general damages claimed by the Purchaser in those circumstances shall be calculated according to normal contractual principles applicable to damages for breach of contract.
GCC 28.3	The text of Sub-clause 28.3 of the GCC is deleted and replaced with the following text: The period of validity of the warranty for the general parts and components (excluding battery packs and electric motors) of the Goods shall be twenty-four (24) months after the Goods or any portion thereof as the case may be have been delivered and put into use by the Vehicle Operator(s). For the purposes of the warranty, the place(s) of the final destination(s) shall be the Site. The period of validity of the warranty for the battery packs and electric motors shall be the expected vehicle life of twelve (12) years or 1.2 million kilometers of service, whichever of these milestones to occur first. The warranty shall cover all the mechanical and electrical failure of parts of the vehicles under normal usage including but not limited to defects in the factory-installed parts, engine, transmission and transaxle parts or towing costs if a vehicle breaks down during a travel. The warranty period shall start from the date when a vehicle shall first be delivered and put into use by the Vehicle Operator(s), including driver training and testing prior to customer operations. In case, when the vehicles are delivered and put into use in groups or lot, the warranty period shall be tracked for the whole group or lot. If the Vehicle Operator(s)/Purchaser does not put the vehicles in use within 120 (one hundred and twenty) days after the Delivery to the Site, the warranty period shall deem to start from the 121st day. The manufacturer/Supplier hereby warrants that it will either repair or replace any general parts or components that are defective in material or workmanship under normal use during the warranty period of twenty-four (24) months, as specified above. The manufacturer/Supplier also warrants that it will either repair or replace any battery pack or electric motor that fails to perform to standards during the warranty period of twelve (12) years or 1.2 million service kilometers, whichever milestone to occur first.

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[6] ***DWF comment**: TBC.*

	The manufacturer/Supplier hereby acknowledges that the warranty coverage shall be fully transferable to subsequent owners. The warranty shall be valid within Sindh Province for the whole period of the warranty even if the Purchaser moves the vehicles from Karachi to other locations. The Purchaser shall be responsible for the movement of the Supplier's personnel and vehicle spare parts outside Karachi.
GCC 28.5	The Supplier shall correct any defects covered by the warranty within three (3) weeks after being notified by the Purchaser of the occurrence of such defects or within any additional time determined by the Purchaser.
GCC 30.1 (b)	The amount of aggregate liability shall be 110 (one hundred and ten) percent of the Contract Price.
The following new Clauses are added after Clause 36 (*Assignment*) of the GCC:	
SCC 37 Related Services	
SCC 37.1 Vehicle Maintenance Supervision	(a) The Supplier shall provide vehicle maintenance supervision for a period of [twenty-four (24) months][7]. (b) The vehicle maintenance supervision period shall start from the date when the vehicles shall first be delivered and put into use by the Vehicle Operator(s), including driver training and testing prior to customer operations. In case the vehicles are delivered and put into use in groups or lot, the vehicle maintenance supervision period shall be tracked for the whole group or lot. If the Vehicle Operator(s) does not put the vehicles in use within 120 (one hundred and twenty) days after the Delivery to the Site, the vehicle maintenance supervision period shall deem to start from the 121st day after the Delivery to the Site. (c) During the period of the vehicle maintenance supervision, the Supplier shall be responsible for supervising all scheduled maintenance activities of the vehicles. The maintenance services will include but not limited to engine tune up, lubrication, replacement of filters, coolants, spark plugs, fuses, worn wiper blades, worn brake pads and linings or worn clutch linings, replacement of tires (if required), batteries and air conditioning. (d) The Supplier shall also provide all replacement parts for all maintenance items due to normal wear and tear as well as scheduled replacements. (e) Conversely, the Vehicle Operator(s) shall be responsible for all repair actions caused by road collisions or other unscheduled incidents described in Sub-paragraph (f) below. (f) The Supplier shall not be responsible for any maintenance arising out of the following: i) Repairs and adjustments required as a result of racing, overloading, negligence, modification, alteration, tampering, disconnection, improper adjustments or repairs, accidents and use of add-on-parts/material.

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[7] ***DWF Comment**: TBC.*

	ii) Cosmetic or surface corrosion from stone chips or scratches in the paint. iii) Damage or surface corrosion from the environment such as acid rain, air borne fall out (chemicals, tree sap, etc.), salt, hail, windstorms, lightning, floods and other acts of God. iv) Repairs and adjustments caused by improper maintenance carried out by the Supplier and/or use of fluids other than the fluids specified in the manufacturer's manual. v) Normal noise, vibration, wear, tear or deterioration such as discoloration, fading, deformation or blur.
SCC 37.2 Maintenance Training Program	The Supplier shall deliver a maintenance training program to prepare the Purchaser and the Vehicle Operator(s) to maintain the vehicle fleet after the completion of vehicle maintenance supervision period. The training program shall entail 320 (three hundred and twenty) hours of actual training sessions delivered at intervals for twenty (20) persons nominated by the Vehicle Operator(s). The training session shall include both classroom instructions and hands on repair work in the depot maintenance area. In addition to the above, the Supplier shall provide a separate "Train the Trainers" program for smaller group of four (4) persons selected from a larger group of trainees. This training program shall enable the Vehicle Operator(s) to directly train the new maintenance staff in future. This "Train the Trainers" program shall involve minimum forty (40) hours of instruction in addition to the maintenance training. i) The Supplier shall provide the following staff for the maintenance training program: Maintenance training specialist with at least seven (7) years of combined verifiable experience in the repair and maintenance of public transport fleets and previous experience of conducting maintenance training programs with transport operators. The Supplier shall also provide the curriculum vitae (CV) of the maintenance training specialist to the Purchaser within fourteen (14) days of the signing of the Contract. ii) The maintenance training specialist shall perform the following activities: The maintenance training specialist will be expected to perform the specified functions at the depot facility provided by the Purchaser. Any support provided by the Supplier to the maintenance training specialist shall be at the Supplier's cost. The Supplier shall prepare and deliver the detailed maintenance manuals for each of the vehicle types. The Supplier shall also prepare and deliver the detailed maintenance training manuals that will form the basis of the training program. The

	maintenance training manuals shall cover all vehicle types provided by the Supplier. If for some reason the maintenance training specialist withdraws from the employment, then the Supplier shall be responsible for recruiting and appointing another individual with the required experience as a substitute, subject to the Purchaser's approval.
SCC 37.3 Driver Training Program	The Supplier shall implement the driver training program to instill safe and professional driving skills for the drivers as described in Annex C (*Supply of Goods*) to the Contract. Upon completion of the driver training program, the Supplier shall provide a course certificate for the drivers indicating driving proficiency. The driver training program shall prepare the drivers to undertake licensing exams under national law to operate large public transport vehicles. The driver training program shall take place prior to the complete Delivery of the Goods. Each trainee shall spend at least eight (8) hours in the actual road testing of a vehicle during the course of the training program. The selection of the drivers for the course shall be the responsibility of the Vehicle Operator(s). The Purchaser shall provide the training venue (including classrooms and driver training area) and the parking area for the storage of the vehicles. The Supplier shall provide a total of 200 (two hundred) hours (four (4) hours per day for ten (10) weeks) of training including both classroom and road testing. Drivers will be available for training of four (4) hours per day, five (5) days per week during a period of ten (10) weeks. The schedule of the driver training program shall be as provided in the Schedule of Supply whereas the dates of the training program may be altered upon mutual agreement between the Purchaser and the Supplier. The details on content of the driver training program shall be as mentioned in Annex D (*Schedule of Supply*) to the Contract. The actual testing for a National public transport driver's license shall be the responsibility of the Purchaser and the Vehicle Operator(s). The Supplier shall not be responsible for any direct testing costs. In addition to the above, the Supplier shall provide a separate "Train the Trainers" program for a smaller group of five (5) persons selected from a larger group of trainees. This training program shall enable the Vehicle Operator(s) to be able to directly train new drivers in the future. The "Train the Trainers" program shall involve at least forty (40) hours of instructions in addition to the driver training program. The "Train the Trainers" program shall take place during and after the driver training program. The selection of the participating individuals in the "Train the Trainers" program shall be the responsibility of the Vehicle Operator(s) and the Purchaser. The following staff shall be provided by the Supplier for the Driver Training Program: Two driver training specialists, each with at least seven (7) years of combined verifiable experience in the operation of high quality public transport fleets and

	experience of conducting driver training programs with transport operators in other locations. The Supplier shall also provide the curriculum vitae (CV) of the driver training specialist to the Purchaser within fourteen (14) days of the signing of the Contract. If for some reason the driver training specialist(s) withdraws from the employment, then the Supplier shall be responsible for recruiting and appointing another individual with the required experience as a substitute, subject to the Purchaser's approval.
SCC 37.4	If the Purchaser notices during the term of the Contract that any of the services provided under this Clause 37 does not meet the Purchaser's requirements then the Purchaser shall give a relevant notice to the Supplier. The notice shall indicate the dissatisfaction of the Purchaser, description of the issue and time period (not less than twenty-one (21) days) to rectify the issue or make a necessary correction. If the Supplier fails to act accordingly within the period mentioned in the Purchaser's notice, the Purchaser shall proceed in accordance with the provisions of Sub-clause 35.1 (*Termination for Default*) of the GCC and other relevant contractual provisions.
SCC 37.5	The Supplier shall provide a full package of spare parts and supplies for the fleet in Karachi, Pakistan as stipulated in Annex B (*Schedule of Supply*) to the Contract. The spare parts and supplies shall be sufficient for the twenty-four (24)-month warranty of the vehicles. Technical specifications attached to Schedule of Supply include the minimum list of spare parts and supplies to be provided during the period of the product guarantee. The Vehicle Operator(s) shall be responsible for the procurement of the spare parts and supplies after the twenty-four (24)-month warranty period as per Sub-clause 28.3 of the SCC.

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 – DRAFT CONTRACTS

BUS PROCUREMENT – ANNEX C – SCHEDULE OF SUPPLY

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

Annex C
Schedule of Supply

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List of Goods and Related Services

Goods-Fleet-1				
Supply and Maintenance Supervision of BRT Vehicles for Karachi Bus Rapid Transit Red Line Project				
Item No.	**Name of Goods or Related Services**	**Description**	**Unit of Measurement**	**Quantity**
List of Goods				
1.	Supply of 8.5-meter BRT vehicles[1][2]	Refer to Technical Specifications for detailed description	No.	[…]
2.	Supply of 12-meter BRT vehicles[1]	Refer to Technical Specifications for detailed description	No.	[…]
3.	Supply of 18-meter BRT vehicles[1]	Refer to Technical Specifications for detailed description	No.	[…]
4.	Supply of full spare parts package for BRT vehicles from the delivery of the first vehicle through the duration of the Contract	Refer to Technical Specifications for detailed description	Lump sum	[…]
5.	Supply of tools and diagnostic equipment two each for each type of BRT vehicle	Refer to Technical Specifications for detailed description	No.	[…]
6.	Supply of tow truck vehicle for the BRT fleet	Refer to Technical Specifications for detailed description	No.	[…]
List of Services				
7.	Vehicle maintenance supervision	Refer to Technical Specifications for detailed description	Month	[24]
8.	Maintenance training program	Refer to Technical Specifications for detailed description	Lump sum	1
9.	Driver training program	Refer to Technical Specifications for detailed description	Lump sum	1

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[1] The “Supply of BRT Vehicles” fully encompasses the following components: i) Supply of BRT vehicles in the quantity specified; ii) Provision of vehicle warranty for BRT vehicle parts and components for a period of 24 months from the delivery of the vehicle in accordance with GCC/SCC 28.3 whereas warranty for battery packs and electric motors shall be for a 12-year vehicle life or 1.2 million kilometers of service, whichever milestone occurs first.

[2] ***DWF comment****: TBC if the fleet will include any other types of vehicles (e.g., 8.5 or 9-meter vehicles).*

10.	Completion of full vehicle homologation, registration and licensing for BRT vehicles	Refer to Technical Specifications for detail description	Lump sum	1
11.	Cost of Inland Transport and associated insurance for supply of vehicles to site	SCC/GCC 1.1(q)	Lump sum	1

Delivery and Completion Schedule

The delivery period shall start as of the signing of the Contract.

Delivery and completion schedule

Item No.	**Description of Goods or Related Services**	**Delivery Schedule (Duration)**	**Location**	**Required Arrival Date of Goods or Completion Date for Related Services**
List of Goods				
1.	Supply of BRT vehicles (8.5-meter, 12-meter and 18-meter buses)[3]	i. Completion of first full unit of 8.5-meter vehicle at Factory: Three (03) months from the date of contract signing. ii. Delivery of first batch/tranche of vehicles comprising a minimum of one-quarter (25%) of the 8.5-meter vehicle quantity: Maximum of five (5) months from the date of contract signing. iii. Delivery of second batch/tranche of vehicles comprising a minimum of another one-quarter (25%) of the 8.5-meter vehicle quantity: Maximum of six (6) months from the date of contract signing. iv. Delivery of the third batch/tranche of vehicles comprising of a minimum of another one-quarter (25%) of the 8.5-meter vehicle quantity: Maximum of seven (7) months from the date of contract signing. v. Delivery of the fourth batch/tranche of vehicles comprising of the quantity required to complete the full order of 8.5-meter vehicles: Maximum of eight (8) months from the date of contract signing.	[…] Karachi, Pakistan	▪ As specified in *Delivery Schedule (Duration)* column.

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[3] ***DWF comment****: TBC if the fleet will include any other types of vehicles (e.g., 8.5 or 9-meter vehicles).*

Item No.	Description of Goods or Related Services	Delivery Schedule (Duration)	Location	Required Arrival Date of Goods or Completion Date for Related Services
		vi. Completion of first full unit of 12-meter vehicle at Factory: Three (3) months from the date of contract signing. vii. Delivery of first batch/tranche of vehicles comprising a minimum of one-quarter (25%) of the 12-meter vehicle quantity: Maximum of five (5) months from the date of contract signing. viii. Delivery of second batch/tranche of vehicles comprising a minimum of another one-quarter (25%) of the 12-meter vehicle quantity: Maximum of six (6) months from the date of contract signing. ix. Delivery of the third batch/tranche of vehicles comprising of a minimum of another one-quarter (25%) of the 12-meter vehicle quantity: Maximum of seven (7) months from the date of contract signing. x. Delivery of the fourth batch/tranche of vehicles comprising of the quantity required to complete the full order of 12-meter vehicles: Maximum of eight (8) months from the date of contract signing xi. Completion of first full unit of 18-meter vehicle at Factory: Four (4) months from the date of contract signing. xii. Delivery of first batch/tranche of vehicles comprising of a minimum of one-quarter (25%) of the 18-meter		

Item No.	Description of Goods or Related Services	Delivery Schedule (Duration)	Location	Required Arrival Date of Goods or Completion Date for Related Services
		vehicle quantity: Maximum of six (6) months from the date of contract signing. xiii. Delivery of second batch/tranche of vehicles comprising of a minimum of another one-quarter (25%) of the 18-meter vehicle quantity: Maximum of seven (5.5) months from the date of contract signing. xiv. Delivery of the third batch/tranche of vehicles comprising of a minimum of one-quarter (25%) of the 18-meter vehicle quantity: Maximum of eight (8) months from the date of contract signing. xv. Delivery of the fourth batch/tranche of vehicles comprising of the quantity required to complete the full order of 18-meter vehicles: Maximum of nine (9) months from the date of contract signing.		
		i. Warranty for parts and components (excluding battery packs and electric motors) over a period of twenty-four (24) months from the delivery of the vehicle in accordance with Sub-clause 28.3 of the GCC/SCC, whereas warranty for battery packs and electric motors shall be for 12-year vehicle life or 1.2 million kilometers of service, whichever milestone occurs first.	[…] Karachi, Pakistan	▪ Warranty effective from the date of delivery of the vehicle for a period of twenty-four (24) months in accordance with Sub-clause 28.3 of the GCC/SCC ▪ Warranty for battery packs and electric motors shall be the expected vehicle life of 12-year life or 1.2 million kilometers of service, whichever milestone occurs first

Item No.	Description of Goods or Related Services	Delivery Schedule (Duration)	Location	Required Arrival Date of Goods or Completion Date for Related Services
2.	Supply of full spare parts package for BRT vehicles from the delivery of the first vehicle through the duration of the Contract	Spare parts delivered in a timely manner to ensure availability during the duration of the Contract	[…] Karachi, Pakistan	▪ Sufficient spare parts available from the date of delivery of vehicle for a period of twenty-four (24) months warranty in accordance with Sub-clause 28.3 of the GCC/SCC
3.	Supply of tools and diagnostic equipment two each for each type of BRT vehicle	Maintenance tools	[…] Karachi, Pakistan	▪ Maintenance tools delivered from the date of the first vehicle delivery
4.	Supply of tow truck vehicle for the BRT fleet.	Tow truck vehicle	[…] Karachi, Pakistan	▪ Tow truck vehicle delivered within [three (03) months] from the date of signing of the Contract
List of Services				
5.	Vehicle maintenance supervision		[…] Karachi, Pakistan	▪ Maintenance supervision provided for a period of [twenty-four (24) months] from the date specified in Sub-clause 37.1 of the SCC.
6.	Maintenance training program		[…]Karachi, Pakistan	▪ Initial maintenance training program shall be completed within [nine (9) months] of signing of the Contract ▪ Final maintenance training program shall be completed by the end of the term of the Contract
7.	Driver training program		[…]Karachi, Pakistan	▪ Driver training program shall be completed within [nine (9) months] of signing of the Contract

Item No.	**Description of Goods or Related Services**	**Delivery Schedule (Duration)**	**Location**	**Required Arrival Date of Goods or Completion Date for Related Services**
8.	Completion of full vehicle homologation, registration and licensing for BRT vehicles	Homologation, registration, and licensing of each vehicle to be completed at time of vehicle delivery	[…] Karachi, Pakistan	▪ Full homologation, registration, and licensing of each vehicle to be completed within [forty-five (45) days] upon the vehicle delivery
9.	Cost of Inland Transport and associated insurance for supply of vehicles to site		[…] Karachi, Pakistan	

Technical Specifications

Item No.	Name of Goods or Related Services	Technical Description, Specifications, and Standards
1.	Supply of 8.5-meter BRT vehicles[4]	Refer to the attached separate volume of Technical Specifications.
2.	Supply of 12-meter BRT vehicles	Refer to the attached separate volume of Technical Specifications.
3.	Supply of 18-meter BRT vehicles	Refer to the attached separate volume of Technical Specifications.
4.	Supply of full spare parts package for BRT vehicles from the delivery of the first vehicle through the duration of the Contract	Refer to the attached separate volume of Technical Specifications.
5.	Supply of tools and diagnostic equipment two each for each type of BRT vehicle	Refer to the attached separate volume of Technical Specifications.
6.	Supply of tow truck vehicle for the BRT fleet	Refer to the attached separate volume of Technical Specifications.
7.	Vehicle maintenance supervision	Refer to the attached separate volume of Technical Specifications.

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[4] ***DWF comment**: TBC if the fleet will include any other types of vehicles (e.g., 8.5 or 9-meter vehicles).*

8.	Maintenance training program	Refer to the attached separate volume of Technical Specifications.
9.	Driver training program	Refer to the attached separate volume of Technical Specifications.
10.	Completion of full vehicle homologation, registration and licensing for BRT vehicles	Refer to the attached separate volume of Technical Specifications.

Note: The information provided by the bidder in Tech-1 to Tech-7 will be used for the evaluation to ascertain compliance to technical specifications along with the other information provided by the bidder in the bid.

Form TECH – 1 Technical Compliance to 8.5-Meter BRT Vehicle Specifications

The Bidder will complete the Technical Compliance table below to indicate the Bidder's adherence to the technical requirements of the BRT vehicles.

If the Bidder is proposing more than one model of 8.5-meter BRT vehicles through an alternative bid, then the Bidder shall complete the table below for each different product.

Product name	

Criteria	**Specification**	**Specifications of Vehicle proposed by the Bidder**
Model year	2018 or latest	
Vehicle length (minimum - maximum)	7.5 – 9.0 meters	
Vehicle width (not including mirrors)	2 500 – 2 560 mm	
Vehicle height (from road surface to highest point on roof) (maximum)	3.5 meters	
Floor height (from road surface to interior floor at doorways)	350 mm	
Ceiling height in front passenger area (from interior floor to ceiling) (minimum)	2 500 mm	
Ceiling height in raised rear passenger area (from interior aisle floor to ceiling) (minimum)	2 100 mm	
Clearance at doorway (from interior floor to door header) (minimum)	2 000 mm	
Axle load, front axle (maximum)	4 000 kg	
Axle load, middle axle	Not applicable	
Axle load, rear-axle (maximum)	8 000 kg	
Steering	Driver compartment on right-hand side of vehicle for vehicle operation on left-hand side of roadway	
Useful life of vehicle (projected)	1.2 million km or 12 years	
Number of median-side passenger doorways	2[5]	

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[5] Number and size of doors and size of wheel-chair bay need to be decided to finish layout and determine seating capacity

Criteria	**Specification**	**Specifications of Vehicle proposed by the Bidder**
Center-line distance between the front median-side doors	2 700 mm[6]	
Center-line distance between the second and third median-side doors	Not applicable	
Free door width per passenger door (minimum)	1 100 mm[7]	
Number of curb-side passenger doorways	1[8]	
Number of manual pull-out boarding bridges from curb-side doors	1	
General seat configuration	2 x 2 (predominantly)	
Seat pitch (reference)	730 mm (result of other limitations)	
Seat width (minimum)	410 mm	
Number of passenger seats (including preferential seats but excluding flip down seats and driver seat) (minimum)	18	
Number of wheelchair bays (minimum)	1	
Total number of flip-down seats in wheelchair bay(s) (minimum)	4	
Length of wheelchair bay(s) (minimum)	1 800 mm[9]	
Number of seats in front women-only section (minimum)	6	
Thickness of flooring material (minimum)	2 mm	
Side window height (minimum)	980 mm	
For the median side (right-side) of the vehicle, distance of outside edge of the wing mirror from the vehicle body (maximum)	200 mm	

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[6] To be updated according to final specs for Green Line. ODBM is waiting for final information regarding this dimension

[7] Number and size of doors and size of wheel-chair bay need to be decided to finish layout and determine seating capacity

[8] Number and size of doors and size of wheel-chair bay need to be decided to finish layout and determine seating capacity

[9] Number and size of doors and size of wheel-chair bay need to be decided to finish layout and determine seating capacity

Criteria	**Specification**	**Specifications of Vehicle proposed by the Bidder**
For the curb side (left-side) of the vehicle, distance of outside edge of the wing mirror from the vehicle body (maximum)	250 mm	
Tire width	To be approved by Purchaser during detailed design	
Tire construction type	Radial	
Distance between outside edge of left front tire sidewall to outside edge of right front outside tire sidewall	To be approved by Purchaser during detailed design	
Distance between outside edge of left middle tire sidewall to outside edge of right middle tire sidewall	Not applicable	
Distance between outside edge of left rear tire sidewall to outside edge of right rear tire sidewall	To be approved by Purchaser during detailed design	
Power ratio (minimum)	12 kW per ton gross vehicle mass	
Power on gradient (minimum)	Maintain 50 km/hr on 4% up grade, 30 km/hr on 8% upgrade and 12 km/hr on 16% upgrade when fully loaded	
Projected maximum operating velocity (maximum)	80 km/hr	
Propulsion system	Compressed Natural Gas (CNG)-Electric Conventional Hybrid	
Fuel and emission standard (minimum)	Euro 6	
Internal noise standard (maximum)	78 dB	
External noise standard (maximum)	81 dB	
External noise standard when idling (maximum)	65 dB	
Turning radius, outer wheel track (maximum)	9.0 meters – 9.4 meters (body)	

Form TECH – 2 Technical Compliance to 12-Meter BRT Vehicle Specifications

The Bidder will complete the Technical Compliance table below to indicate the Bidder's adherence to the technical requirements of the BRT vehicles.

If the Bidder is proposing more than one model of 12-meter BRT vehicles through an alternative bid, then the Bidder shall complete the table below for each different product.

Product name	

Criteria	**Specification**	**Specifications of Vehicle proposed by the Bidder**
Model year	2018 or latest	
Vehicle length (minimum - maximum)	11.5 - 13.0 meters	
Vehicle width (not including mirrors)	2 540 – 2 560 mm	
Vehicle height (from road surface to highest point on roof) (maximum)	3.5 meters	
Floor height (from road surface to interior floor at doorways)	350 mm	
Ceiling height in front passenger area (from interior floor to ceiling) (minimum)	2 500 mm	
Ceiling height in raised rear passenger area (from interior aisle floor to ceiling) (minimum)	2 100 mm	
Clearance at doorway (from interior floor to door header) (minimum)	2 000 mm	
Axle load, front axle (maximum)	7 700 kg	
Axle load, middle axle	Not applicable	
Axle load, rear-axle (maximum)	13 000 kg	
Steering	Driver compartment on right-hand side of vehicle for vehicle operation on left-hand side of roadway	
Useful life of vehicle (projected)	1.2 million km or 12 years	
Number of median-side passenger doorways	2	
Center-line distance between the front median-side doors	2 700 mm[10]	

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[10] To be updated according to final specs for Green Line. ODBM is waiting for final information regarding this dimension

Criteria	**Specification**	**Specifications of Vehicle proposed by the Bidder**
Center-line distance between the second and third median-side doors	Not applicable	
Free door width per passenger door (minimum)	1 100 mm	
Number of curb-side passenger doorways	2	
Number of manual pull-out boarding bridges from curb-side doors	1 (one at the back curb-side door)	
General seat configuration	2 x 2 (predominantly)	
Seat pitch (reference)	730 mm (result of other limitations)	
Seat width (minimum)	410 mm	
Number of passenger seats (including preferential seats but excluding flip down seats and driver seat) (minimum)	28	
Number of wheelchair bays (minimum)	1	
Total number of flip-down seats in wheelchair bay(s) (minimum)	4	
Length of wheelchair bay(s) (minimum)	1 800 mm	
Number of seats in front women-only section (minimum)	10	
Thickness of flooring material (minimum)	2 mm	
Side window height (minimum)	980 mm	
For the median side (right-side) of the vehicle, distance of outside edge of the wing mirror from the vehicle body (maximum)	200 mm	
For the curb side (left-side) of the vehicle, distance of outside edge of the wing mirror from the vehicle body (maximum)	250 mm	
Tire width	To be approved by Purchaser during detailed design	
Tire construction type	Radial	
Distance between outside edge of left front tire sidewall to outside edge of right front outside tire sidewall	To be approved by Purchaser during detailed design	
Distance between outside edge of left middle tire sidewall to outside edge of right middle tire sidewall	Not applicable	

Criteria	**Specification**	**Specifications of Vehicle proposed by the Bidder**
Distance between outside edge of left rear tire sidewall to outside edge of right rear tire sidewall	To be approved by Purchaser during detailed design	
Power ratio (minimum)	11 kW per ton gross vehicle mass	
Power on gradient (minimum)	Maintain 50 km/hr on 4% up grade, 30 km/hr on 8% upgrade and 12 km/hr on 16% upgrade when fully loaded	
Projected maximum operating velocity (maximum)	80 km/hr	
Propulsion system	Compressed Natural Gas (CNG)-Electric Conventional Hybrid	
Fuel and emission standard (minimum)	Euro 6	
Internal noise standard (maximum)	78 dB	
External noise standard (maximum)	81 dB	
External noise standard when idling (maximum)	65 dB	
Turning radius, outer wheel track (maximum)	13.0 meters – 13.4 meters (body)	

Form TECH – 3 Technical Compliance to 18-Meter BRT Vehicle Specifications

The Bidder will complete the Technical Compliance table below to indicate the Bidder's adherence to the technical requirements of the BRT vehicles.

If the Bidder is proposing more than one model of 18-meter BRT vehicles through an alternative bid, then the Bidder shall complete the table below for each different product.

Product name	

Criteria	**Specification**	**Specifications of Vehicle proposed by the Bidder**
Model year	2018 or latest	
Vehicle length (minimum - maximum)	17.5 - 19.0 meters	
Vehicle width (not including mirrors)	2 540 – 2 560 mm	
Vehicle height (from road surface to highest point on roof) (maximum)	3.5 meters	
Floor height (from road surface to interior floor at doorways)	350 mm	
Ceiling height in front passenger area (from interior floor to ceiling) (minimum)	2 500 mm	
Ceiling height in raised rear passenger area (from interior aisle floor to ceiling) (minimum)	2 100 mm	
Clearance at doorway (from interior floor to door header) (minimum)	2 000 mm	
Axle load, front axle (maximum)	7 700 kg	
Axle load, middle axle	13 000 kg	
Axle load, rear-axle (maximum)	13 000 kg	
Steering	Driver compartment on right-hand side of vehicle for vehicle operation on left-hand side of roadway	
Useful life of vehicle (projected)	1.2 million km or 12 years	
Number of median-side passenger doorways	3	
Center-line distance between the front median-side doors	2 700 mm[11]	

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[11] To be updated according to final specs for Green Line. ODBM is waiting for final information regarding this dimension

Criteria	**Specification**	**Specifications of Vehicle proposed by the Bidder**
Center-line distance between the second and third median-side doors	5 780 mm[12]	
Free door width per passenger door (minimum)	1 100 mm	
Number of curb-side passenger doorways	0	
Number of manual pull-out boarding bridges from curb-side doors	Not applicable	
General seat configuration	2 x 2 (predominantly)	
Seat pitch (reference)	730 mm (result of other limitations)	
Seat width (minimum)	410 mm	
Number of passenger seats (including preferential seats but excluding flip down seats and driver seat) (minimum)	48	
Number of wheelchair bays (minimum)	2	
Total number of flip-down seats in wheelchair bay(s) (minimum)	5	
Length of wheelchair bay(s) (minimum)	1 300 mm each	
Number of seats in front women-only section (minimum)	12	
Thickness of flooring material (minimum)	2 mm	
Side window height (minimum)	980 mm	
For the median side (right-side) of the vehicle, distance of outside edge of the wing mirror from the vehicle body (maximum)	200 mm	
For the curb side (left-side) of the vehicle, distance of outside edge of the wing mirror from the vehicle body (maximum)	250 mm	
Tire width	To be approved by Purchaser during detailed design	
Tire construction type	Radial	
Distance between outside edge of left front tire sidewall to outside edge of right front outside tire sidewall	To be approved by Purchaser during detailed design	

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[12] To be updated according to final specs for Green Line. ODBM is waiting for final information regarding this dimension

Criteria	**Specification**	**Specifications of Vehicle proposed by the Bidder**
Distance between outside edge of left middle tire sidewall to outside edge of right middle tire sidewall	To be approved by Purchaser during detailed design	
Distance between outside edge of left rear tire sidewall to outside edge of right rear tire sidewall	To be approved by Purchaser during detailed design	
Power ratio (minimum)	11 kW per ton gross vehicle mass	
Power on gradient (minimum)	Maintain 40 km/hr on 4% up grade and 20 km/hr on 8% upgrade when fully loaded	
Projected maximum operating velocity (maximum)	80 km/hr	
Propulsion system	Compressed Natural Gas (CNG)-Electric Conventional Hybrid	
Fuel and emission standard (minimum)	Euro 6	
Internal noise standard (maximum)	78 dB	
External noise standard (maximum)	81 dB	
External noise standard when idling (maximum)	65 dB	
Turning radius, outer wheel track (maximum)	13.0 meters – 13.4 meters (body)	

Form TECH – 4 Detailed drawings

The Bidder will submit detailed drawings of the proposed body shape for each product option being offered. The drawings imagery will highlight the exterior shape of the vehicle. The drawings should offer at least four perspectives: right side, left side, front, and rear. The Bidder may also provide imagery of similar vehicles.

The Bidder shall also provide detailed drawings of the vehicle interior with the key dimensions clearly noted.

The detailed drawings shall be attached to Section 4 (Bidding Forms).

Form TECH – 5 Description of body and structural materials

The Bidder will submit a description of the body and structural materials utilized for the vehicle. The technical specification calls for the use of high strength corrosive-resistant materials. Mild steel is the minimum requirement for the body and structural elements of the vehicles. The use of materials with superior strength, corrosion resistance, and overall durability is encouraged. The use of stainless steel alloys (such as 3CR-12), high-carbon steel, glass-reinforced plastic (GFRP), aluminum, and other materials should be considered, particularly for critical sections of the body and structural elements.

The description of the body and structural materials shall be attached to Section 4 (Bidding Forms).

Form TECH – 6 List of spare parts and supplies

The Supplier shall provide all replacement parts and supplies for all maintenance issues resulting from normal wear and tear as well as items requiring scheduled replacements. The third-party BRT Vehicle Operators will be responsible for all materials and associated costs for repair actions caused by road collisions or other unscheduled incidents.

The supply of spare parts and supplies will cover the period from the delivery of the first vehicles through the duration of the Contract (twenty-four (24) months from the delivery of the vehicles in accordance with GCC/SCC Sub-clause 28.3) Two BRT Vehicle Operators will be contracted by the Purchaser. The spare parts will be distributed between the two different BRT Vehicle Operators at two different depot sites. The Supplier must thus provide two sets of spare parts, one for each depot facility.

Before the conclusion of the Contract, the Supplier will also provide a final stock of spare parts and supplies at each depot facility. The table below is the minimum list of spare parts and supplies to be provided at the conclusion of the Contract. The quantities of spare parts and supplies to be provided at the Contract conclusion are found in Volume 2B of the Technical Specifications. Two sets of the spare parts and supplies are to be provided.
If any spare part or supply listed in the table below is not applicable to the vehicle technology, the Bidder will make note of this non-applicability. The Bidder will also indicate any additional spare parts and supplies that will be provided during the Contract period and may add those parts in the list provided in the table below.

Form TECH 7 - Spare parts list

Part description	**Applicability (Yes) / Non-Applicability (No) for proposed vehicle**
Oil filter	________________________
Diesel engine oil	________________________
Fuel filter	________________________
Water trap filter	________________________
Set tappet cover gaskets	________________________
Oil separator	________________________
V-belt	________________________
Air filter	________________________
Compressed air drier cartridge	________________________
Poly V-belt	________________________
Poly V-belt tensioner	________________________
Starter, alternator, and vehicle battery	________________________
Full battery pack for plug-in electric propulsion system	________________________
Regenerative braking system assembly	________________________
Slow-charger unit (minimum 50 kW)	________________________
Disc brake pads	________________________
Touch-up paint for all colors used on the vehicle (quantity in liters)	________________________
Full windscreen assembly	________________________
Side window glass unit	________________________
Head lamp assembly, including globes (2 lamps per set)	________________________
Rear brake light / indicator light assembly, including globes (2 assemblies per set, left and right)	________________________
Exterior wing mirrors (arms and mirrors, left and right mirrors per set)	________________________
Wiper blades (2 per set)	________________________
Interior light globes	________________________
Full seat assembly	________________________
Back and bottom seat cushion set	________________________
Floor cover material (quantity in square meters)	________________________
Door assembly (including doors, valves, switches)	________________________
CD-style boarding bridge assembly	________________________
Interior partition wall / advertising unit	________________________
Wheel unit	________________________
Engine cooling system unit	________________________
Transmission system / gearbox unit	________________________
Air conditioning unit	________________________
Vehicle Logic Unit (VLU)	________________________
Driver Data Terminal (DDT)	________________________

Part description	**Applicability (Yes) / Non-Applicability (No) for proposed vehicle**
Digital Video Recorder (DVR)	____________________________
Door opening and closing synchronization unit	____________________________
CCTV camera	____________________________
Interior variable messaging display unit	____________________________
Infotainment display unit	____________________________

*** The bidders may add rows for additional spare parts in the table above.**

KARACHI
BUS RAPID TRANSIT
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PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 –DRAFT CONTRACTS

BUS PROCUREMENT – ANNEX D – PERFORMANCE GUARANTEE

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

Annex D
Performance Guarantee

Bank's name, and address of issuing branch or office [1]

Beneficiary: .... *insert name and address of the Purchaser* ....

Date: ....*insert date (as day, month, and year)* ....

Performance Guarantee No.: ....

We have been informed that . . . . . *name of the Supplier. . . . .* (the "**Supplier**") has entered into Contract No. . . . . . *reference number of the contract. . . . .* dated . . . . .with you, for the execution of . . . . . . *name of contract and brief description of goods and related services. . . . .* (the "**Contract**").

We understand that, according to the conditions of the Contract, a performance guarantee is required.

As instructed by the Supplier, we . . . . . *name of the bank. . . . .* hereby irrevocably and unconditionally undertake to pay you any sum or sums not exceeding in total an amount of . . . . *name of the currency and amount in words*[2]*. . . . .* (. . . . . *amount in figures. . . . .*), such sum being payable in the types and proportions of currencies in which the Contract Price is payable, within [*number of days*] from the date of receipt by us of your first demand in writing accompanied by a written statement stating that the Supplier is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein and without regard to any objections or defences to your demand from the Supplier or any other person.

Any payments under this guarantee shall be made free and clear of, and without deduction for or on account of, any present or future taxes, levies, duties, charges, fees, deductions or withholdings of any nature whatsoever.

This guarantee shall expire, no later than the . . . . . day of . . . . , ... ,[3] and any demand for payment under it must be received by us at this office on or before that date.

[This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. [458/758], except that subparagraph (ii) of Sub-article 20(a) is hereby excluded.] [4]

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[1] All italicized text is for guidance on how to prepare this demand guarantee and shall be deleted from the final document.

[2] The guarantor shall insert an amount representing the percentage of the Contract Price specified in the Contract and denominated either in the currency(ies) of the Contract or a freely convertible currency acceptable to the Purchaser.

[3] Insert the date twenty-eight (28) days after the expected completion date. The Purchaser should note that in the event of an extension of the time for completion of the Contract, the Purchaser would need to request an extension of this guarantee from the guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Purchaser might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months][one year], in response to the Purchaser's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."

[4] Or the same or similar to this clause specified in the Uniform Rules for Demand Guarantees, ICC Publication No. 758, where applicable.

. . . .

Signature(s) and seal of bank (where appropriate)

-- Note to Bidder --

If the institution issuing the performance guarantee is located outside the country of the Purchaser, it shall have a correspondent financial institution located in the country of the Purchaser to make it enforceable.

KARACHI BUS RAPID TRANSIT PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 – DRAFT CONTRACTS

BUS PROCUREMENT – ANNEX E – ADVANCE PAYMENT SECURITY

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

Annex E
Advance Payment Security

[*insert complete name and number of the Contract*]

To: [*insert complete name of the Purchaser*]

In accordance with Sub-clause 16.1 of Annex A (*General Conditions of Contract*) to the Contract in relation to advance payments, [*insert complete name of the Supplier*] (the "**Supplier**") shall deposit with the Purchaser a security consisting of [*indicate type of security*] to guarantee its proper and faithful performance of the obligations imposed on the Supplier under the terms of the Contract, in the amount of [*insert currency and amount of guarantee in words and figures*].

We, the undersigned [*insert complete name of the guarantor*], legally domiciled in [*insert full address of the guarantor*] (the "**Guarantor**"), as instructed by the Supplier, agree unconditionally and irrevocably to guarantee as primary obligor and not as surety merely, the payment to the Purchaser on its first demand without whatsoever right of objection on our part or any objections or defences from the Supplier or any other person, and without your first claim to the Supplier, in the amount not exceeding [*insert currency and amount of guarantee in words and figures*].

This guarantee shall remain valid and in full effect from the date of the advance payment being received by the Supplier under the Contract until [*insert date (as day, month, and year)*].

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458 [*or ICC Publication No. 758 as applicable*].

Name: [*insert complete name of person signing the Security*]

In the capacity of [*insert legal capacity of person signing the Security*]

Signed: [*insert signature of person whose name and capacity are shown above*]

Duly authorized to sign the guarantee for and on behalf of [*insert seal (where appropriate) and complete name of the guarantor*]

Date: [*insert date of signing*]

-- Note to Bidder --

If the institution issuing the advance payment security is located outside the country of the Purchaser, it shall have a correspondent financial institution located in the country of the Purchaser to make it enforceable.

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BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 – DRAFT CONTRACTS

BUS PROCUREMENT – ANNEX F – LIST OF ELIGIBLE COUNTRIES

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

Annex F
Eligible Countries

No nationality restrictions apply, other than any restrictions arising from […]][1]

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[1] ***DWF comment**: TBC.*

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 – DRAFT CONTRACTS

BUS PROCUREMENT – CONTRACT AND LETTER OF ACCEPTANCE

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

Notification of Award

---- on the official letterhead of the Purchaser ----

Letter of Acceptance

. . . . *date*. . . . . . .

To: . . . . *name and address of the Supplier* . . . .

Subject: . . . . *Notification of Award Contract No*. . . . .

This is to notify you that your Bid dated . . . . *date* . . . . for the execution of the . . . . *name of the contract and identification number, as given in the Bid Data Sheet* . . . . for the Accepted Contract Amount of the equivalent of . . . . *amount in words and figures and name of currency* . . . . , as corrected and modified in accordance with the Instructions to Bidders, is hereby accepted by our Agency.

You are requested to provide the Performance Guarantee within twenty-eight (28) days in accordance with the Contract using for that purpose the Performance Guarantee form described in Annex D (*Performance Guarantee*) to the Contract.

Authorized Signature: ……………………………………………………………………………………..

Name and Title of Signatory: ……………………………………………………………………………..

Name of Agency: ……………………………………………………………………………………….

Attachment: Contract

Contract

THIS CONTRACT is made on the *[insert date]* day of *[insert month]*, *[insert year]*, between *[insert complete name of the Purchaser]* of *[insert complete address of the Purchaser]* (the "**Purchaser**"), and *[insert complete name of the Supplier]* of *[insert complete address of the Supplier]* (the "**Supplier**").

WHEREAS the Purchaser invited Bids for certain Goods and Related Services and has accepted a Bid by the Supplier for the supply of those Goods and Related Services in the sum of *[insert currency or currencies and amount of contract price in words and figures]* (the "**Contract Price**"),

NOW IT IS AGREED AS FOLLOWS:

1. In this Contract, words and expressions shall have the same meanings as given to them in the Contract and the Contract Documents unless the context requires otherwise.

2. The following documents (the "**Contract Documents**") shall be deemed to form and be read and construed as part of this Contract:

   (a) Letter of Acceptance of the Supplier's Bid signed by the relevant governmental authority;
   (b) Annex B (*Special Conditions of Contract*) to the Contract;
   (c) Annex A (*General Conditions of Contract*) to the Contract;
   (d) Annex C (*Schedule of Supply*) to the Contract;
   (e) Annex D (*Performance Guarantee*) to the Contract;
   (f) Annex E (*Advance Payment Security*) to the Contract;
   (g) Annex F (*List of Eligible Countries*) to the Contract;
   (h) [Price Submission Sheet and Price Schedules submitted by the Supplier][1]; and
   (i) [Technical Bid Submission Sheet submitted by the Supplier][2].

   This Contract shall prevail over all Contract Documents. The Contract Documents are to be taken as mutually explanatory of one another. Unless, in each case, otherwise agreed in writing by the Purchaser, to the extent that there are any discrepancies between any of the Contract Documents listed in Clause 2 of the Contract, the Contract Document appearing higher in the list shall prevail except that where the requirements for the Goods and the Related Services (including any requirements or standards as to design, workmanship, materials or performance) set out in any of the Contract Documents are different, the higher standard prevail and the Supplier shall be obliged to comply with that higher standard.

3. In consideration of the payments to be made by the Purchaser to the Supplier in accordance with this Contract, the Supplier hereby agrees to provide the Goods and the Related Services to the Purchaser and, if applicable, to remedy defects therein in conformity in all respects with the provisions of the Contract.

4. The Purchaser hereby agrees to pay the Supplier in consideration of the provision of the Goods and the Related Services and, if applicable, the remedying of defects therein the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

5. The Contract Price shall consist of [*insert currency or currencies and amount of contract price in words and figures*] for the Goods and [*insert currency or currencies and amount of contract price in words and figures*] for the Related Services.

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[1] ***DWF Comment****: TBC if these documents will be part of the bidding package and if they (or any other bidding documents) should be included in the Contract Documents.*

[2] ***DWF Comment****: TBC if these documents will be part of the bidding package and if they (or any other bidding documents) should be included in the Contract Documents.*

THIS CONTRACT has been executed in accordance with the laws of *[indicated name of country]* on the date stated at the beginning of this Contract.

Signed by *[insert authorized signature for the Purchaser]* (for the Purchaser)

Signed by *[insert authorized signature for the Supplier]* (for the Supplier)

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

Interim Report 3 – Appendix A - FINAL

OUTPUT 2.3 – RED LINE – DRAFT CONTRACTS

ANNEX A - COMMERCIAL CONCESSION AGREEMENT

November 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

DWF Draft/22/10/2020

[*Date*]

(**1**) **TRANSKARACHI**

and

(**2**) **[●]**

CONCESSION AGREEMENT FOR COMMERCIAL ACTIVITIES

relating to Karachi Sustainable Bus Rapid Transit Project

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[1] ***DWF comment**: To be updated when the draft is finalised/approved by TransKarachi.*

THIS CONCESSION AGREEMENT FOR COMMERCIAL ACTIVITIES (the "**Agreement**") is made on [*Date*]

BETWEEN

1. **TRANSKARACHI**, a company existing under the laws of Pakistan, licenced under Section 42 of the Companies Act, 2017, with company registration number [●], whose registered office is at [●] (**"TK**" which expression shall include its successors-in-interest and permitted assigns); and
2. **[●]**, a company incorporated in [●], with company registration number [●], whose registered office is at [●] (the "**Concessionaire**").

TK and the Concessionaire are individually referred to herein as a "**Party**" and collectively as the "**Parties**".

WHEREAS

A. TK is a corporate entity established by the Sindh Mass Transit Authority and is responsible for the operation and management of the Bus Rapid Transit (BRT) System in Karachi, Pakistan.

B. TK is the owner of the Properties (as further defined herein), and has sought to put in place strategies, including concession for commercial activities, which would best maximise the returns from the Properties.

C. The Concessionaire is engaged in operating a concession for commercial activities business.

D. TK wishes to grant to the Concessionaire an [exclusive] right to operate a concession for commercial activities at the Properties under the terms and conditions of this Agreement.

NOW, THEREFORE, in consideration of the mutual terms, conditions, promises, covenants and payments hereinafter set forth, and other good and valuable consideration the receipt of which is hereby acknowledged, TK and the Concessionaire **agree as follows**:

1. Definitions and Interpretation

1.1. Definitions

In the Agreement, except to the extent that the context requires otherwise, the following words and expressions shall have the meanings stated below:

"**Agreement**" means this Agreement, together with all Schedules hereto (including each Transaction Addendum concluded from time to time by the Parties).

"**Business Day**" means any day other than a Saturday, Sunday or public holiday in the Islamic Republic of Pakistan.

"**Change in Law**" means

(a) the adoption of a new law; or

(b) a change in or repeal of an existing law,

which after the Effective Date results in a change in the taxes, duties or levies payable by the Concessionaire in respect of the Concession Right, or a change in or the repeal of any other requirements in connection with the Concession Right.

"**Commencement Date**" has the meaning set out in Clause 4.1 of this Agreement.

"**Concession Right**" means an [exclusive] right granted by TK to the Concessionaire to operate a concession for commercial activities at the Properties (including but not limited to carry out activities necessary for the [sale], lease, rent and use of the Properties and for maximising the financial return from the Properties) on the terms and conditions specified in this Agreement.

"**Confidential Information**" has the meaning set out in Clause 16 (*Confidentiality*) of this Agreement.

"**Direct Costs**" means reasonable costs actually and properly incurred by the Concessionaire in the operation of the Concession Right relating directly and being limited to the costs of complying with its maintenance obligations under Clause 13 (*Maintenance of the Properties*) of this Agreement, unless those costs are passed on to the Occupational Tenants.

"**Disincentive Fees**" has the meaning set out in Clause 6.4 of this Agreement.

"**Documents**" means all printouts, drawings, plans, budgets, specifications, calculations, publicity material, schedules, reports and other information and documents which have been or shall be prepared by or on behalf of the Concessionaire in the course of exercising its Concession Right and performing its obligations under this Agreement.

"**Effective Date**" means the date of signature of this Agreement by the Parties stated at the beginning of the Agreement.

“**Event of Force Majeure**” means an exceptional event or circumstance (a) which is beyond a Party's control; (b) which such Party could not reasonably have foreseen or made provision against before entering into this Agreement; (c) which, having arisen, such Party could not reasonably have avoided or overcome; and (d) which is not substantially attributable to the other Party. The Events of Force Majeure include exceptional events or circumstances of the kind listed below (or any combination of them), so long as the conditions in items (a) to (d) above are satisfied: an act of God or public enemy, fire, explosion, earthquake, perils of the sea, flood, storm or other adverse weather conditions, war declared or undeclared, act of terrorism, civil war, revolution, civil commotion or other civil disorder, sabotage, riot, blockade, embargo, strikes (excluding strikes by the Concessionaire's personnel), sanctions, actions of any governmental authority in relation to epidemics or pandemics and compliance with law, regulations or lawful demands of any government or governmental authority.

"**Funding Reserve Account**" means a separate bank account to be established by the Concessionaire for the purpose of creating a "reserve fund" to be used solely as described in Clause 6.5 of this Agreement. The funds in the Funding Reserve Account may be placed on fixed deposit by the Concessionaire with any bank or financial institution in Pakistan, unless otherwise mutually agreed in writing between the Parties, provided always that such funds remain liquid and readily accessible.

"**Initial Term**" has the meaning set out in Clause 5.1 of this Agreement.

"**Occupancy Rules**" means the rules developed and enforced by TK from time to time.

"**Occupational Leases**" means the leases, underleases, tenancy agreements, licences and any other documents granting Occupational Tenants the right to occupy and use the whole or any part of the Properties and **Occupational Lease** shall have the same corresponding meaning.

"**Occupational Tenants**" means the persons having the right to occupy and use the whole or any part of the Properties pursuant to the Occupational Leases and **Occupational Tenant** shall have the same corresponding meaning.

"**Parent Company**" means an entity:

(c) of which the Concessionaire (or any member if the Concessionaire is a joint venture, partnership, consortium or other association of two or more entities or persons) is a branch, subsidiary or other similar related entity; or

which directly or indirectly exercises management control over the Concessionaire (or any member if the Concessionaire is a joint venture, partnership, consortium or other association of two or more entities or persons).

“**Parent Company Guarantee**” means the guarantee to be provided to TK by the Parent Company of the Concessionaire pursuant to Clause 9 (*Parent Company Guarantee*) of this Agreement, substantially in the form provided in Schedule 2 (*Guarantee Forms*) to this Agreement.

"**Performance Guarantee"** means the unconditional, irrevocable on-demand performance guarantee in the specimen form attached hereto as Schedule 2 (*Guarantee Forms*) provided to TK by the Concessionaire pursuant to Clause 10 (*Performance Guarantee*) of this Agreement.

"**PKR**" means the Pakistani Rupee, the official currency of the Islamic Republic of Pakistan.

"**Prohibited Act**" means:

(a) offering, giving or agreeing to give to a Public Official a gift or consideration of any kind as an inducement or reward for:

doing or not doing (or for having done or not having done) any act; or

showing or not showing (or for having shown or not shown) favour or disfavour to any person,

in relation to the award or performance of the Agreement or any other agreement with TK; or

entering into an agreement for which commission has been paid or has been agreed to be paid by the Concessionaire or on its behalf, or to its knowledge, unless before the relevant agreement is entered into, particulars of any such commission and of the terms of any such agreement for the payment thereof have been disclosed in writing to TK; or

committing any offence under the applicable laws creating offences in respect of fraudulent acts; or

defrauding, attempting to defraud or conspiring to defraud TK.

"**Properties**" means the buildings and premises as referred to in paragraph (B) of the preamble to this Agreement and as detailed in the relevant Transaction Addenda, and **Property** shall have the same corresponding meaning. Any reference to the Properties is to the whole or any part of them as the circumstances may require.

“**Property Documents**” means the Property Use Agreements, Occupational Leases and other deeds and documents relating to the Properties including those set out in Schedule 3 (*Property Documents*) to this Agreement and all deeds and documents that are supplemental or ancillary to or which vary any of them.

"**Property Use Agreements**" means the property use, licence or lease agreements (as the case may be) to be concluded between TK and the Concessionaire for the temporary possession or use and maintenance of the Properties, substantially in the form in Schedule 4 (*Property Use Agreements*).

"**Public Official**" means an official or employee of a government owned or controlled enterprise or any regulatory body, and shall include any individual defined as a public official in the applicable laws.

"**Renewal Term**" has the meaning set out in Clause 5.2 of this Agreement.

"**Rental**" means the minimum guaranteed monthly rental payable by the Concessionaire to TK recorded in the Transaction Addendum in respect of each Property.

"**Revenue**" means [the consideration charged for each quarter to the Occupational Tenants by the Concessionaire in respect of the Occupational Tenants' use of the Properties].

"**Surviving Provisions**" means Clause 1 (*Definitions and Interpretation*), Clause 3 (*Priority in Documents*), Clause 4 (*Conditions Precedent*), Clause 16 (*Confidentiality*), Clause 17 (*Intellectual Property Rights*), Clause 199 (*Termination*), Clause 20 (*Consequences of Termination*), Clause 21 (*Amendments*), Clause 22 (*Assignment*), Clause 23 (*Communications*), Clause 24 (*Governing Law and Language*), Clause 25 (*Dispute Resolution*) and Clause 26 (*Miscellaneous*).

"**Term**" means collectively the Initial Term and each Renewal Term.

"**Termination Date**" means the date upon which this Agreement is terminated in accordance with the provisions of this Agreement, or as otherwise agreed between the Parties in writing.

"**Transaction Addendum**" an addendum to this Agreement in respect of one or more Properties, executed by the Parties, which materially conforms to the addendum contained in Schedule 1 (*Transaction Addendum*) to this Agreement, and **Transaction Addenda** shall have the same corresponding meaning.

"**Turnover Rental**" means [an amount expressed as a percentage of the following formula: Revenue - Direct Costs, recorded in the Transaction Addendum and charged to the Concessionaire][2].

1.2. Interpretation

In the Agreement, except where the context requires otherwise:

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[2] ***DWF comment****: TBD with TransKarachi. Under the proposed draft, the Concessionaire will be required to pay to TransKarachi: (1)* ***the minimum Rental amount*** *for the use/rent of the Properties; (2)* ***a separate charge for utilities consumption*** *payable in respect of the Properties; (3)* ***the Turnover Rental****, which constitutes an amount expressed as a percentage of the following formula: Revenue (consideration charged for each quarter to the Occupational Tenants by the Concessionaire) - Direct Costs (which are limited to the cost of complying with maintenance obligations (e.g., repair works, illumination, painting, etc.) and unless those costs are passed on to the Occupational Tenants), except where repairs are required because of gross negligence or wilful misconduct of the Concessionaire; and (4)* ***Disincentive Fees*** *for violations of operating standards or failure to adhere to contractual requirements.*

1.2.1. references to a provision of law or a technical standard are references to that provision as amended, updated, extended or re-enacted and include all laws and official requirements made under or deriving from it or enacting such modification;

1.2.2. words indicating one gender include all genders;

1.2.3. words indicating the singular also include the plural and vice versa;

1.2.4. headings are for ease of reference only and shall not be used in the interpretation of the Agreement;

1.2.5. the words "include" and "including" are to be construed without limitation;

1.2.6. references to a "person" includes any person, firm, company, corporation, government, state or agency of a state, or any association, foundation, trust or partnership (whether or not having separate legal personality) or two or more of the foregoing and words denoting natural persons include any other persons;

1.2.7. references to Clauses and Schedules are to clauses and schedules to the Agreement;

1.2.8. references to an agreement, instrument, licence, code or other documents (including the Agreement), or to a provision contained in any of these, shall be construed, at the particular time, as a reference to it as it may then have been amended, varied, supplemented, modified, suspended, assigned or novated; and

1.2.9. unless provided otherwise, references to "written" or "in writing" mean hand-written, type-written, printed or electronically made, in each case resulting in a permanent record.

2. Concession

2.1. TK hereby grants the Concession Right to the Concessionaire in respect of the Properties as detailed in the Transaction Addenda.

2.2. The information and particulars specified in the Transaction Addenda may be amended, varied, amplified, cancelled or added to at any time during the duration of the Agreement by means of further Transaction Addenda to be dated and signed by the Parties and which will thereafter be bound into and form an integral part of this Agreement and be interpreted in all respects in accordance with the provisions of this Agreement.

2.3. The Concessionaire hereby undertakes not to make or allow to be made any alterations or additions whatsoever (including external, internal, structural or non-structural) to the Properties, including electrical and plumbing installations, without TK's prior written approval.

2.4. The Concessionaire hereby agrees that it will not enter into an agreement with any Occupational Tenant that would restrict or negate the rights and powers of TK under this Agreement.

2.5. Any Occupational Lease with any Occupational Tenant shall be subject to the prior written approval by TK or, as the case may be, any agreement with any Occupational Tenant shall be [substantially] in the form agreed between the Parties.

2.6. The Parties acknowledge and agree that to the extent that the Concessionaire concludes any agreement with one or more Occupational Tenant in accordance with the Concession Right, such agreement shall, under no circumstances, be construed as a cession, assignment, delegation or transfer of any of the Concessionaire's rights and obligations under this Agreement.

2.7. The Concessionaire shall within [twenty (20)] days from the Effective Date obtain, at its own cost, any approval, licence, permission or consent required by law to enable the Concessionaire to fully perform its obligations and exercise the Concession Right in accordance with this Agreement, and the Concessionaire, accordingly, indemnifies TK against any and all liabilities, claims, costs and expenses of whatsoever nature in respect thereof.

3. Priority in Documents

3.1. In the event of any inconsistency between the provisions of the body of this Agreement, the Schedules and the Transaction Addenda, the conflict shall be resolved according to the following descending order of priority:

3.1.1. the body of this Agreement;

3.1.2. the Schedules to the Agreement;

3.1.3. the Transaction Addenda.

4. Conditions Precedent

4.1. TK shall issue a notice indicating the date upon which all the conditions precedent have been fully satisfied (and/or waived as applicable) and the date on which the Concessionaire may fully commence exercising the Concession Right, or the relevant date can be specified in the Transaction Addendum (the "**Commencement Date**").

4.2. The conditions precedent that are required to be satisfied (and/or waived as applicable) are as follows:

4.2.1. the Concessionaire has provided to TK the Parent Company Guarantee in accordance with Clause 9 (*Parent Company Guarantee*) of this Agreement;

4.2.2. the Concessionaire has provided to TK the Performance Guarantee in accordance with Clause 10 (*Performance Guarantee*) of this Agreement;

4.2.3. the relevant Property Use Agreements are executed by the Parties[, substantially in the form attached hereto as Schedule 4 (*Property Use Agreements*)]; and

4.2.4. if TK, in its sole discretion, decides to use standard forms for the agreements with the Occupational Tenants – the Parties agree on the relevant standard forms and initial them.

4.3. The Parties shall use their best endeavours to procure the fulfilment of each of the above conditions precedent.

4.4. The Parties shall be entitled, by written agreement, to waive any of the above conditions precedent (only to the extent that the relevant condition precedent is capable of waiver under the applicable laws).

4.5. If any of the above conditions precedent remains unfulfilled (and is not waived) for an unreasonably long time (in the opinion of TK), then, save and except for the Surviving Provisions, TK shall be entitled to consider this Agreement null and void *ab initio* and TK shall be discharged from any and all liability that may have arisen or that may arise under this Agreement.

5. Term

5.1. **Notwithstanding the Effective Date, the Concession Right shall commence on the Commencement Date an**d shall continue for the initial period of [one (1) year] (the "**Initial Term**"), unless terminated earlier in accordance with the termination provisions of the Agreement.

5.2. The Initial Term shall automatically be renewed for a renewal term of [one (1) year] (the "**Renewal Term**"), unless at least [sixty (60) days] prior to the expiry of the Initial Term, either Party gives the other Party a written notice of its intention not to renew the Agreement.

6. Financial Matters

As consideration for the grant by TK to the Concessionaire of the Concession Right, the Concessionaire shall pay to TK:

1.1 Rental

6.1.1 The Concessionaire shall effect the Rental payment to TK each month of the Agreement. The Rental shall (i) be payable in arrear, on or before the last Business Day of each and every month; and (ii) be paid by debit order or electronic funds transfer to TK's bank account or any other payment method agreed to by TK, and without deductions, bank charges, set-off or exchange.

6.1.2 Upon such payment of the Rental, the Concessionaire shall furnish TK with documentary proof, reasonably satisfactory to TK, of having effected the same.

6.1.3 [The Rental shall never be less than that stipulated in the Transaction Addendum and shall escalate on each anniversary of the Commencement Date by [●].]

1.2 Utilities

In addition to the payment of the Rental by the Concessionaire, the Concessionaire shall effect payment to TK of a separate charge for utilities consumption payable in respect of the Properties monthly in arrear.

1.3 Turnover Rental

6.1.1. The Concessionaire shall furnish a Turnover Rental calculation in a form acceptable to TK and simultaneously pay the quarterly Turnover Rental to TK for each quarter, in arrear, [seven (7) days] after the end of that quarter.

6.1.2. The Concessionaire shall account for all Properties under this Agreement as one Turnover Rental Calculation.

6.1.3. TK shall be entitled to inspect, at its instance and at any time, any and all agreements (and any and all amendments thereto) between the Concessionaire and the Occupational Tenants to ensure that the Turnover Rental calculations are accurate.

1.4 Disincentive Fees

6.1.4. The Concessionaire shall operate and maintain a standard of service and quality at least equal to that high standard provided at comparable locations, while at the same time operating in a commercially reasonable and legally required manner.

6.1.5. The Concessionaire hereby agrees to pay to TK the fees for violations of operating standards or failure to adhere to contractual requirements, as specified in the Transaction Addendum. The Disincentive Fees shall be in addition to any other amounts payable by the Concessionaire to TK under the terms of this Agreement.

6.1.6. The Concessionaire waives, to the extent permitted by applicable laws, any defence as to the validity and amounts of the Disincentive Fees set out in this Agreement on the grounds that such Disincentive Fees are void as penalties or otherwise.

1.5 Funding Reserve Account

6.1.7. The Concessionaire will also be obliged to deduct on a monthly basis an amount equal to [three (3)] percent of the Revenue and transfer the same into the Funding Reserve Account for the purpose of establishing a reserve fund to pay for the upkeep of the Properties. Any funds in the Funding Reserve Account (including any interest generated by such funds) may only be used by the Concessionaire with the prior written approval of TK.

6.1.8. Unless instructed otherwise by TK, the maximum amount of the funds held in the Funding Reserve Account at any point of time cannot exceed [●].

6.1.9. If, upon the expiry of the Term of the Agreement or its earlier termination, no amounts are due and/or payable to TK under this Agreement and the Concessionaire has duly performed all of its other obligations under this Agreement, then the Concessionaire shall (within thirty (30) days of such expiry or termination), be entitled to close the Funding Reserve Account and retain any and all amounts remaining therein.

1.6 Taxes

6.1.10. The Concessionaire represents and warrants that as of the Effective Date, the Concessionaire will remain compliant with all applicable laws relating to taxation in the Islamic Republic of Pakistan.

6.1.11. If applicable, the Concessionaire shall deliver to TK on the Effective Date and each anniversary thereof during the Term a valid tax clearance certificate issued to the Concessionaire by the relevant authorities for then-current year.

7. Records and Reporting

7.1. The Concessionaire shall create and maintain books, records and accounts which shall, in reasonable detail, accurately and fairly reflect financial transactions and accounting operations relating to the Concession Right in accordance with generally accepted accounting principles in a manner acceptable to TK, separate and distinct from other financial operations conducted by the Concessionaire.

7.2. The Concessionaire shall prepare an opening balance sheet listing assets and liabilities used, incurred or associated in or with the operation of the Concession Right. Thereafter, the Concessionaire shall prepare monthly financial statements that shall include unaudited balance sheets and income and expenditure statements (each month's records shall be referred to separately as the "monthly financial statements"). The Concessionaire shall deliver a copy of the preceding month's monthly financial statements within fifteen (15) days after the end of that month.

7.3. Within thirty (30) days after the end of each calendar quarter, the Concessionaire shall deliver to TK the following information, in a form reasonably acceptable to TK: an income and expenditure statement, balance sheet, cash flow statement and budget variance report showing the results of the Concession Right for such quarter, which statements shall include sufficient detail to reflect all revenue, and which shall further breakdown revenues and expenses in such categories as appropriate and/or as reasonably required by TK.

7.4. The Concessionaire shall deliver to TK a copy of the financial statements of its activities relating to the Concession Right within thirty (30) days after each anniversary of the Commencement Date.

8. Inspection and Review

8.1. TK shall, at all times and on reasonable notice to the Concessionaire, be granted full and unfettered access to the Concessionaire's accounting records, books and source documents and shall be able to inspect them, take extracts from them, make copies of them and conduct periodic audits of them for the purposes of establishing due compliance by the Concessionaire with its obligations under the Agreement. The Concessionaire shall comply with all recommendations made by TK as a result of these audits.

8.2. In addition, TK shall up to [one (1) year] after termination of this Agreement, be entitled to inspect books and records with respect to the Concessionaire's activities relating to the Concession Right at TK's expense.

9. Parent Company Guarantee

9.1. In the event that the Concessionaire is a branch, subsidiary, affiliate or otherwise of a Parent Company, then the Concessionaire shall, at its own expense, procure the Parent Company Guarantee for the benefit of TK from its Parent Company.

9.2. In the event that the Concessionaire is a joint venture, partnership, consortium or other association of two or more entities or persons and any member of the Concessionaire is a branch, subsidiary, affiliate or otherwise of a Parent Company, then each such member shall, at its own expense, procure the Parent Company Guarantee for the benefit of TK from its Parent Company.

10. Performance Guarantee

10.1. The Concessionaire shall ensure that it maintains with TK a valid and enforceable Performance Guarantee until the Concessionaire has fulfilled all of its obligations under the Agreement. The Concessionaire shall have delivered to TK as a condition precedent, as specified in Clause 4.2.2 of the Agreement, the duly executed Performance Guarantee in the form attached hereto as Schedule 2 (*Guarantee Forms*) and in the amount of PKR [●] for the due and punctual fulfilment of all obligations and due and punctual payment of all amounts which may at any time be or become owing by the Concessionaire to TK. The Performance Guarantee shall have a term of [one (1) year and ninety (90) days] and shall be renewed or replaced no later than thirty (30) days before its expiry. Such renewed or replacement Performance Guarantee shall be delivered to TK no later than fifteen

(15) days prior to the expiry of the existing Performance Guarantee. TK shall return the previously provided Performance Guarantee to the Concessionaire within ten (10) days of the receipt of the replacement Performance Guarantee.

10.2. The Performance Guarantee shall be issued by a local bank with a minimum net asset value of PKR [●], as approved by TK.

10.3. If the Concessionaire fails to provide TK with a replacement Performance Guarantee as required under this Agreement, TK may (without prejudice to its other remedies) immediately liquidate all or part of the Performance Guarantee.

10.4. If the Performance Guarantee is partially liquidated, the Concessionaire is obliged to replenish the Performance Guarantee in full within seven (7) days of the date of any liquidation thereof. If the Concessionaire fails to replenish the Performance Guarantee in accordance with this Clause, this shall constitute a breach of this Agreement and TK shall be entitled to liquidate the remainder of the Performance Guarantee and terminate this Agreement pursuant to Clause 18 [*Termination*] of this Agreement.

10.5. The Concessionaire shall not be entitled to set-off against the Performance Guarantee any amount payable by it under the terms of this Agreement.

10.6. Subject to the fulfilment by the Concessionaire of all of its obligations under this Agreement, the Performance Guarantee shall be released by TK within thirty (30) days after the Termination Date.

10.7. All fees, taxes and expenses associated with preparing, providing, issuing, extending, replacing, replenishing or stamping (if applicable) of the Performance Guarantee shall be borne by the Concessionaire.

11. The Concessionaire's Duties and Obligations[3]

11.1. The Concessionaire hereby undertakes:

11.1.1. to carry out activities necessary for the [sale], lease, rent and use of the Properties;

11.1.2. to use its reasonable endeavours to procure such number, type and quality of the Occupational Leases so as to maximise the Revenue;

11.1.3. to deal with all landlord and tenant matters which may arise at the Properties, including negotiating and entering into the Occupational Leases with the Occupational Tenants, administering rental guarantees, rent deposit accounts, arranging renewals of the Occupational Leases;

11.1.4. to regularly monitor the quality and performance of the Properties as a commercial business and suggest any actions with the objective to improve the Properties and attract new Occupational Tenants and income stream for the Properties;

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[3] ***DWF comment****: TBC by TK.*

11.1.5. to consider all options for maximising Revenue and value enhancement opportunities derived from the Properties (in particular, revenue generation from any car parking facilities, seasonal promotion activities, as well as revenue generation from any other unutilised space at the Properties, etc.);

11.1.6. to exercise in the performance of the obligations set out in the Agreement all the skill, care and diligence reasonably to be expected of an appropriately qualified and competent concessionaire experienced in performing the same obligations which the Concessionaire is obliged to perform pursuant to the Agreement in relation to projects of a similar size, scope, character, complexity and value to the Properties;

11.1.7. to take appropriate actions in the event of rent arrears or any other breach of the Occupational Leases in an effort to remedy the breach;

11.1.8. to ensure that the Properties are maintained to a high standard and design and as specified in Clause 13 (*Maintenance of the Properties*) of this Agreement;

11.1.9. to keep, at all times, each property in a clean and tidy condition. Should any Property, in the sole opinion of TK, require cleaning, such work shall promptly be attended by the Concessionaire and at the cost of the Concessionaire within twenty-four (24) hours after receipt of a written notification by TK to do so;

11.1.10. to organise the provision of and payment for all services in connection with the Properties, including insurance, assessments, utility charges, rates, all repairs and services;

11.1.11. not to make or allow to be made any alterations or additions whatsoever (including external, internal, structural or non-structural) to the Properties, including electrical and plumbing installations, without TK's prior written approval;

11.1.12. to supervise all staff working at the Properties, including contractors and building suppliers;

11.1.13. to advise TK on the necessity or desirability of any refurbishment, alterations or improvements to the Properties;

11.1.14. to deal with all rating matters affecting the Properties, including any proposals or objections made by TK to the rating authorities as well as making and conducting all rating appeals, if any;

11.1.15. to ensure the Properties are thoroughly secured and arrange and manage security for the Properties, as approved by TK;

11.1.16. not to do or permit to be done on the Properties anything which is illegal or which may be or become a nuisance (whether actionable or not), annoyance, inconvenience or disturbance to TK, any owner or occupier of neighbouring properties or any members of the general public;

11.1.17. to observe the Occupancy Rules (governing the use of the Properties) TK makes and notifies to the Concessionaire from time to time;

11.1.18. to notify TK of any health and safety hazards which may exist or arise at the Properties of which the Concessionaire becomes aware and any environmental hazards or actual or potential contamination of which it is or becomes aware. In addition the Concessionaire shall notify TK if an Occupational Tenant becomes involved in any business or activity that might reasonably be expected to lead to a breach of any environmental legislation or which could or might give rise to a claim or enforcement action pursuant to same;

11.1.19. not to commence any legal proceedings or legal process without the prior written approval of TK;

11.1.20. [that should any Property or any portion thereof be damaged or destroyed at any time during the duration of this Agreement [(or should any Property or any portion thereof be damaged or destroyed as a result of the exercise by the Concessionaire of the Concession Right)], it shall, within a reasonable period of time and its own cost and expense, repair that Property (or any portion thereof) so that after such repairs, the Property shall be substantially in the same condition as it was prior to such damage or destruction;]

11.1.21. to obey and perform all the requirements of any relevant statute, regulation, by-law, standards and orders of any competent authorities and keep TK indemnified against any and all liabilities, claims, costs and expenses of whatsoever nature in respect of the use of the Properties;

11.1.22. to notify TK immediately on becoming aware of any petition for an administration order or liquidation application made against the Concessionaire;

11.1.23. to submit, within thirty (30) days of the Commencement Date, and thereafter on an annual basis, a business plan and a marketing plan relevant to the Properties allocated to the Concessionaire, which shall include the anticipated Revenue to be generated therefrom;

11.1.24. at its own cost and expense, to appoint a full-time manager, who shall be responsible for attending to the day-to-day operation of the Properties, and, if applicable, any other suitably qualified and competent personnel necessary for the efficient and proper performance by the Concessionaire of its obligations under this Agreement.

11.1.25. [●];

11.1.26. [●]; and

11.1.27. [●];

12. Access to and use of the Properties

12.1. The Concessionaire shall execute with TK as a condition precedent, as specified in Clause 4.2.3 of the Agreement, the Property Use Agreements in relation to the Properties, which shall determine the Concessionaire's respective rights and obligations in relation to the use, maintenance of and access to the Properties.

13. Maintenance of the Properties

13.1. The Concessionaire shall maintain all Properties to the standards required by TK and, if applicable, in accordance with the relevant Property Use Documents and with such programmes for paintings, maintenance and rebuilding of the Properties as may be agreed between the Parties. The Concessionaire agrees to provide all equipment required for the safe construction, maintenance and use of the Properties and maintain all such equipment in a clean, safe and fully operational condition.

13.2. The cost of all repairs to, maintenance of and improvements to the Properties shall be the Direct Costs, except where repairs are required because of gross negligence or wilful misconduct of the Concessionaire and/or the relevant costs are passed on to the Occupational Tenants.

13.3. All fixtures, structures, facilities and other improvements existing on the Commencement Date, along with any future additions and alterations made to the Properties by the Concessionaire (except trade fixtures not permanently affixed to the Properties, and any other personality of the Concessionaire), shall become TK's property upon construction and installation.

14. Warranties, Representations and Undertakings by the Concessionaire

The Concessionaire warrants, represents and undertakes to TK that:

14.1.1. The Concessionaire is and shall remain duly incorporated and validly existing under the laws of its jurisdiction of incorporation.

14.1.2. The Concessionaire has and shall continue to have the necessary legal capacity to enter into and perform each of its obligations under this Agreement and has taken all necessary corporate and/or internal action to authorise the execution and performance of this Agreement.

14.1.3. The execution of the Agreement and performance by the Concessionaire of its obligations hereunder does not and shall not: (i) contravene any law or regulation to which the Concessionaire is subject; or (ii) contravene any provision of the Concessionaire's founding documents; or (iii) conflict with, or result in a breach of any terms of, or constitute a default under any agreement or other instrument to which the Concessionaire is a party or by which it or any of its assets are bound.

14.1.4. The provisions of this Agreement are and shall remain legally binding on the Concessionaire and the execution and performance of all rights and obligations imposed on the Concessionaire pursuant to this Agreement constitute legal, valid, binding and enforceable rights and obligations of the Concessionaire.

14.1.5. No proceedings or other steps have been taken and not discharged (nor threatened) for its winding-up or dissolution or for the appointment of a receiver, administrative receiver, administrator, liquidator, trustee or similar officer in relation to any of its assets or revenues.

14.1.6. All information disclosed by or on behalf of the Concessionaire to TK is true, complete and accurate in all material respects and the Concessionaire is not aware of any material facts or circumstances not disclosed to TK which would, if disclosed, be likely to have an adverse effect on TK’s decision (acting reasonably) to award this Agreement to the Concessionaire.

15. Liability, Indemnity and Insurance

15.1. The Concessionaire shall be responsible for (and hereby indemnifies TK against) any expense, cost, claim, action, proceeding, damages or liability (including any cost or expense incurred by TK in enforcing this indemnity) in respect of any personal or fatal injuries, death, loss, damage to any property or person (including property of TK, its employees, agents, contractors, customers or invitees) arising out of or incidental to or in connection with the performance, acts or omissions of the Concessionaire, its employees, agents, or sub-contractors, unless such is proven to have arisen from the wilful misconduct or gross negligence of TK.

15.2. The Concessionaire further indemnifies and agrees to hold TK harmless against all claims, demands, suits, proceedings, judgments, damages, loss, costs, charges, fines, penalties, taxes and expenses, of whatsoever nature incurred by either of the Parties, or by any third party, in consequence of a failure by the Concessionaire to comply with the terms of this Agreement or any applicable laws.

15.3. Further, TK shall not, under any circumstances, be liable to the Concessionaire, its employees, agents, contractors, customers, invitees or any other person or legal entity for any loss or damage which may be sustained in or upon the Properties caused by, or as a result of, any theft, burglary, pillage or similar cause.

15.4. The Concessionaire agrees to, at its own costs, establish and maintain no less than the minimum types and levels of insurances that are required by the applicable laws.

15.5. The Concessionaire shall effect and maintain, at its own cost, with reputable insurers a policy(ies) of insurance in the name of the Concessionaire on the terms satisfactory to TK[4]:

15.5.1. [●];

15.5.2. [●]; and

15.5.3. [●].

15.6. The Concessionaire shall produce on written demand for inspection by TK at any time the relevant insurance policy(ies) and proof that the premium in respect thereof has been paid.

15.7. The Concessionaire shall use its best endeavours to arrange to have TK's interests noted against the insurance policy(ies) referred to in Clause 15.5 above as well as against any renewal thereof.

15.8. The Concessionaire, its employees, agents, contractors, customers or invitees shall not do or omit to do anything, or allow anything to be done which would or may constitute a contravention of the terms of any insurance policy held from time to time by TK in respect of the Properties or which may increase the insurance premium. Without prejudice to any other rights or remedies which TK may have as a result of any breach by the Concessionaire of this Clause 15.8, TK may recover from the Concessionaire the full amount of any increase in insurance premiums in respect of the Properties, on demand. TK's insurance policy(ies) is(are) available for inspection by the Concessionaire and the Concessionaire shall acquaint itself with the terms thereof.

15.9. The Concessionaire warrants to TK that it will immediately notify TK if the insurances required in terms of Clause 15.5 cease to be available generally in the market or if for any other reason the Concessionaire is unable to continue to maintain such insurances.

16. Confidentiality

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[4] ***DWF comment**: TBC by TK*.

16.1. Each Party undertakes to keep confidential and not to disclose to any person except with the prior written consent of the other Party:

16.1.1. the details of this Agreement, the details of the negotiations leading to this Agreement and the information handed over to such Party during the course of negotiations, as well as the details of all transactions or agreements contemplated in this Agreement; and

16.1.2. all information relating to the business or the operations and affairs of the Parties (together "**Confidential Information**").

16.2. The Parties agree to keep all Confidential Information confidential and disclose it only to their officers, directors, employees, consultants and professional advisers who: (i) are aware that the Confidential Information shall be kept confidential; (ii) are aware of the disclosing Party's undertaking in relation to such information in accordance with this Agreement; and (iii) have been directed by the disclosing Party to keep the Confidential Information confidential and have undertaken to keep the Confidential Information confidential.

16.3. The obligations of the Parties in relation to the maintenance and non-disclosure of the Confidential Information under this Agreement do not extend to information that:

16.3.1. is disclosed to the receiving Party in accordance with this Agreement but at the time of such disclosure such information is known to be in the lawful possession or control of that Party and not subject to an obligation of confidentiality;

16.3.2. is or becomes public knowledge, otherwise than pursuant to a breach of this Agreement by the Party who discloses such Confidential Information; and

16.3.3. is required by the provisions of any law, statute or regulation, or during any court proceedings, or by the rules or regulations of any recognised stock exchange to be disclosed and subject to the provisions of Clause 16.2 above, the Party required to make the disclosure has taken all reasonable steps to oppose or prevent the disclosure of and to limit the extent of such disclosure and has consulted with the other Party prior to making such disclosure.

16.4. The Concessionaire shall not make any comments to the media relating to this Agreement and any related matter, nor shall it respond to any queries from the media without the prior written approval of TK.

17. Intellectual Property Rights

17.1. [The Concessionaire grants to TK a non-exclusive royalty-free and irrevocable licence to use and reproduce the Documents and other works it owns for any purpose relating to the Properties including maintenance, letting, promotion, management, disposal, advertisement, reinstatement, repair, alteration, modification, extension and use of the Properties. Such licence shall permit the copying and use of the Documents for any purpose in connection with the Properties. This licence shall be transferable by TK and shall permit the granting of sub-licences. The Concessionaire shall not be liable for any use or reproduction of the Documents except for which they were originally prepared by or on behalf of the Concessionaire.]

17.2. The Concessionaire warrants to TK that in the performance of the Concession Right it has not and will not (and will procure that none of its employees, agents or sub-contractors will) knowingly infringe any copyright or other intellectual property or design rights or copy wholly or substantially the work or designs of any third party.

17.3. The Concessionaire shall be liable to and indemnify TK against any and all costs, claims, fees, damages, losses or expenses which TK suffers or incurs:

17.3.1. by reason of any infringement of copyright, intellectual property or design rights by the Concessionaire, its employees, agents or sub-contractors; and

17.3.2. in the event that the rights granted by the Concessionaire pursuant to this Clause 17 are at any time determined by a court of law to be invalid, ineffective or impaired in any way.

18. **Force Majeure**

18.1. If either Party is prevented, hindered or delayed in whole or in part from performing its obligations pursuant to this Agreement as a result of an Event of Force Majeure, such Party shall, as soon as reasonably practicable, notify the other Party accordingly. The notice shall contain the following information:

18.1.1. the obligations which are affected and the extent to which the relevant Party cannot perform those obligations;

18.1.2. a detailed description of the Event of Force Majeure;

18.1.3. an estimate of the time period which the Event of Force Majeure is envisaged to continue; and

18.1.4. the measures proposed to be adopted to remedy or minimise the effects of and costs arising from the Event of Force Majeure. If the Concessionaire is the Party prevented from performing its obligations as a result of the Event of Force Majeure and TK is of the opinion that the measures proposed are not adequate, it shall, by written notice, advise the Concessionaire accordingly. Such notice may propose alternate or additional measures which in the opinion of TK may curtail the Event of Force Majeure and/or the costs arising therefrom. Notwithstanding the provisions of this Clause 18.1.4, the Concessionaire shall be obliged to take all proactive steps as may be reasonably possible in anticipation of Events of Force Majeure so as to enable the Concessionaire to mitigate the financial effects thereof.

18.2. The Party prevented from performing its obligations pursuant to this Agreement as a result of an Event of Force Majeure shall:

18.2.1. be excused from performing its obligations under the Agreement for so long as the Event of Force Majeure continues and to the extent that the performance of its obligations is so prevented, hindered or delayed;

18.2.2. use all reasonable endeavours to remedy or minimise the effects of the Event of Force Majeure;

18.2.3. take all reasonable and necessary steps available to it as contemplated in Clause 18.1.4 to mitigate any loss suffered by such Party or the other Party as a result of that Party’s failure to discharge its obligations pursuant to this Agreement; and

18.2.4. as soon as practicable after the end of the Event of Force Majeure resume performance of its obligations under this Agreement.

18.3. If an Event of Force Majeure continues uninterrupted for more than [three (3) months] and continues to prevent a Party from performing all of its obligations under this Agreement, either Party shall be entitled to terminate this Agreement upon fourteen (14) days' notice to the other Party, provided that before doing so the Parties shall first have met to find a mutually satisfactory solution for remedying such Event of Force Majeure and no Party shall terminate this Agreement unless the Parties are unable to agree on a solution.

19. Termination

19.1. In the event that:

19.1.1. the Concessionaire fails to timeously provide or maintain the Performance Guarantee; or

19.1.2. the Concessionaire fails to timeously provide or maintain the Parent Company Guarantee; or

19.1.3. the Concessionaire fails to effect payment of the Rental or the Turnover Rental or other amount due by it under the Agreement on due date and fails to remedy such breach within [ten (10) days] of having been required in writing to do so; or

19.1.4. the Concessionaire breaches any of the other provisions of this Agreement and fails to remedy such breach within [fourteen (14) days] of having been notified in writing to do so; or

19.1.5. the Concessionaire commits a material breach of any Property Use Agreement; or

19.1.6. the Concessionaire is liquidated, placed under business rescue or is sequestrated (whether provisionally or finally and whether voluntary or compulsorily); or

19.1.7. the Concessionaire effects a general compromise with its creditors or any other arrangement with its creditors, necessitated by the inability of the Concessionaire to pay its debts; or

19.1.8. the Concessionaire has judgment of a material nature taken against it likely to affect the Concessionaire's status as a going concern and fails to satisfy or apply to have the same set aside within seven (7) days of becoming aware thereof; or

19.1.9. the Concessionaire disposes of its business or the whole or greater part of the assets comprising the business without TK's prior written consent to such disposal having been obtained; or

19.1.10. the Concessionaire fails or refuse to execute a lawful instruction of TK or, in the opinion of TK, acts contrary to the provision(s) of any applicable laws or the management rules or directive issued by TK from time to time; or

19.1.11. the Concessionaire fails to obtain or maintain as required any of the necessary licences/permits/consents to be used in the exercise of the Concession Right or has such necessary licences/permits/consents withdrawn, cancelled, suspended or revoked; or

19.1.12. the Concessionaire acts or attempts to act in a fraudulent or otherwise illegal manner in obtaining or executing a contract with any government department, provincial administration, municipality, public body, company or person; or

19.1.13. [the Concessionaire incurs more than PKR [●] in the Disincentive Fees in any period of two consecutive quarters; or]

19.1.14. [●]; or

19.1.15. [●],

TK shall be entitled, but not obliged notwithstanding any previous waiver or anything to the contrary provided in this Agreement, in addition to and without prejudice to any other right it may have under the applicable laws or in accordance with this Agreement, to seek specific performance of this Agreement or to terminate this Agreement, eject the Concessionaire from the Properties and recover from the Concessionaire any losses and damages suffered by TK and those amounts which became due for payment by the Concessionaire hereunder prior to the date of such termination.

19.2. [TK shall be entitled to terminate this Agreement by giving notice of such termination to the Concessionaire, if TK sells or disposes of all or substantial part of the Properties.]

19.3. Should TK decide to terminate this Agreement and the Concessionaire disputes TK's right to terminate:

19.3.1. the Concessionaire shall, pending the determination of such dispute, continue to pay to TK all amounts payable hereunder on or before the date or dates on which such moneys would have been due but for the termination, and TK shall be entitled to accept and recover such payments and the acceptance thereof shall be without prejudice to and shall not in any way whatsoever affect TK's right to termination then in dispute. The acceptance by TK of such payments from the Concessionaire will in no way create a new implied month-to-month concession agreement in respect of the Properties; and

19.3.2. TK's right to claim damages suffered by it as a result of the Concessionaire's breach of this Agreement will not be affected.

19.4. If TK[5]:

19.4.1 commits a material breach of this Agreement (other than a breach of payment obligations) and fails to remedy the breach within twenty (20) Business Days after receipt from the Concessionaire of a notice calling upon it to do so; or

19.4.2 commits a breach of any payment obligation in accordance with this Agreement and fails without justification to make payment within thirty (30) Business Days after receipt from the Concessionaire of a notice calling upon it to do so , then the Concessionaire shall be entitled, in addition to and without prejudice to any other right it may have under the applicable laws or under the terms of this Agreement, to seek specific performance of the terms of this Agreement or to terminate this Agreement upon [sixty (60) days'] notice to TK and in either event, to recover such costs, losses and damages as it may have sustained.

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[5] ***DWF comment**: TBC by TransKarachi.*

20. Consequences of Termination

20.1. On termination of this Agreement for any reason whatsoever and without prejudice to any right either Party may have against the other arising from termination of this Agreement, the Concessionaire shall, if instructed:

20.1.1. take such steps as may be necessary to handover to TK, or any successor concessionaire or property management agent appointed by TK, all aspects of the management of the Properties which form part of the Concessionaire's responsibilities under this Agreement and co-operate and assist fully TK and the relevant successor;

20.1.2. provide to TK at least [●] complete sets of the Documents, Property Documents and other records and information in its possession or under its control relating to the Properties (whether in the course of preparation or completed) in a usable and compatible format in hard copy and one complete set in electronic format as and when TK may reasonably require;

20.1.3. assign to TK, or as TK may direct, its interest in the Documents, Property Documents and any contracts entered into by the Concessionaire under this Agreement relating to the Properties; and

20.1.4. [●].

20.2. Termination of the Concessionaire's engagement under this Agreement shall be without prejudice to the rights and remedies of TK in relation to any fraud, negligence, default or breach of contract by the Concessionaire prior to such termination.

20.3. The termination of this Agreement will not affect the continuance of the obligation of confidentiality contained in Clause 16 (*Confidentiality*).

20.4. On termination of this Agreement, TK may immediately appoint auditors to check and verify all relevant books, records and other data of the Concessionaire, and the Concessionaire shall give full cooperation in that regard and make all such information available to TK on request.

21. Amendments

21.1. Except as set out elsewhere in this Agreement, no modification, amendment, addendum or variation to the Agreement shall be effective or binding, unless it: (i) is made in writing; and (ii) expressly sets out the modification, amendment, addendum or variation to the Agreement; and (iii) refers to the Agreement; and (iv) is signed and dated by an authorised representative of each Party.

22. Assignment

22.1. The Concessionaire shall not cede, assign, delegate, novate, subcontract or transfer any of its rights or obligations under the Agreement, or any part of it, or any benefit or interest therein, to any person without the prior written consent of TK.

22.2. Notwithstanding anything to the contrary stated in this Agreement, TK shall be entitled, without requiring the consent of the Concessionaire, to cede, assign, delegate, novate or transfer any rights and/or obligations under this Agreement to any third party.

23. Communications

23.1. Wherever the Agreement provides for the giving or issuing of approvals, consents, notices or requests, these communications shall be:

23.1.1. in writing and delivered by hand (against receipt), sent by registered mail or courier, or transmitted using any of the systems of electronic transmission agreed between the Parties, including scanned and emailed letters[, followed by registered mail]; and

23.1.2. delivered, sent or transmitted to the following address or email address (as applicable) for the recipient's communications:

In the case of TK:

[*Address*]

Attention:

[*Email*]; and

In the case of the Concessionaire:

[*Address*]

Attention:

[*Email*];

23.1.3. provided that: (i) any oral communications shall not become binding upon the Party to whom they are given until they are confirmed in writing; (ii) if the recipient gives notice of another address, communications shall thereafter be delivered accordingly; and (iii) if the recipient has not stated otherwise, it may be sent to the address from which the communication was issued.

23.2. Any communication addressed in accordance with Clause 23.1 which has been sent by:

23.2.1. registered mail shall be deemed to have been received within [fourteen (14)] days after the same shall have been posted and, in proving such service, it shall be sufficient to produce a registered mail receipt confirming the correct postage address of the addressee in accordance with Clause 23.1; and

23.2.2. electronic mail shall be deemed to have been received on the day of dispatch if dispatched prior to 17.00 hours Pakistan time, but otherwise on the next Business Day, provided that receipt shall not be taken to have occurred if the sender receives an automated message indicating that the email has not been delivered to the recipient.

24. Governing Law and Language

24.1. This Agreement and any non-contractual obligations arising out of or in connection with it shall be governed, interpreted and construed in accordance with the laws of the Islamic Republic of Pakistan.

24.2. The language for written communications under the Agreement and all other communications and documentation arising out of or in connection with the Agreement or the performance or termination of the Agreement shall be the English language.

24.3. If there are versions of any part of the Agreement or any communications pursuant to the Agreement which are written in more than one language, the version which is in the English language shall prevail.

25. Dispute Resolution

25.1. Disputes

For the purposes of this Clause 25, the term “dispute” shall be interpreted in its widest sense and shall include any dispute or difference in connection with or in respect of the conclusion or existence of this Agreement, the carrying into effect of this Agreement, the interpretation or application of the provisions of this Agreement, the Parties’ respective rights and obligations in accordance with and arising out of this Agreement or the validity, enforceability, rectification, termination or cancellation, whether in whole or in part, of this Agreement. Save as otherwise provided for in this Agreement, any dispute between the Parties arising in connection with this Agreement shall be resolved in accordance with the provisions of this Clause 25.

25.2. Resolution by Chief Executives

Any dispute arising in connection with this Agreement may be referred by either Party to the chief executive of the Concessionaire and the chief executive of TK (or such other senior executives as the relevant Party may determine) who shall attempt to resolve the matter within fifteen (15) Business Days of the dispute being so referred to them or within such other time as may be agreed between the Parties.

25.3. Arbitration

If the Parties are unable to resolve the dispute pursuant to Clause 25.2 above, either Party shall be entitled to refer a dispute to arbitration in accordance with this Clause 25.3 by notifying the other Party in writing of its intention to do so.

25.3.1. [The arbitration proceedings shall be carried out under the procedures, rules and regulations of Arbitration Act, 1940 and its successors, and such procedures, rules and regulations shall be deemed to be incorporated into this Clause 25.3 by reference.]

25.3.2. The seat of the arbitration shall be Pakistan and all arbitration hearings shall be held in Karachi, unless otherwise agreed in writing by the Parties.

25.3.3. Unless otherwise required by TK, such arbitration shall be conducted in the English language and the award of any arbitrator or arbitral panel, together with the reasons for the determination, shall be written in the English language.

25.3.4. Unless otherwise required by TK, all evidence, submissions or documents presented at the arbitration in a language other than in the English language shall be accompanied by a simultaneous English language translation thereof, if oral, or if written, a certified English language translation.

25.3.5. The arbitrator or arbitral panel shall have full power to open up, review and revise any determinations, decisions or findings in relation to the dispute.

25.3.6. The obligations of the Parties shall not be altered by reason of the arbitration being conducted during the duration of the Agreement.

25.3.7. Any monetary award in any arbitration shall be denominated and payable in PKR.

25.3.8. The Parties agree that all interim or final decisions and/or awards of the arbitrator or arbitral panel shall: (i) be binding on the Parties and shall be given effect and implemented forthwith by them; and (ii) be subject to the confidentiality restrictions in this Agreement and except as provided by agreement between the Parties, may not be publicised or otherwise disclosed provided always that nothing in this Clause shall prevent either Party from applying to any court of competent jurisdiction to enforce the award.

25.3.9. The Parties hereby expressly agree irrevocably to waive all rights and recourse to appeal or challenge, and neither Party shall request the local courts to open up, revise or review, the final award of the arbitrator or arbitral panel save and except in the specific instances set out in [Arbitration Act, 1940].

25.3.10. Reference of a dispute to arbitration shall not in any way vitiate nor invalidate the Agreement, and the Concessionaire shall proceed with its obligations under the Agreement with all due diligence.

26. Miscellaneous

26.1. [Interest on arrears

In the event that any amount due and owing by the Concessionaire to TK under this Agreement is not paid promptly on due date, then such overdue amount shall, without prejudice to any other rights or remedies which may vest in TK, attract interest at the SBP interest rate[6] plus three (3) percent, from due date to date of payment. For the purposes of this Clause, "SBP interest rate" means the benchmark interest rate of the State Bank of Pakistan.]

26.2. Remedies

No remedy conferred by this Agreement is intended to be exclusive of any other remedy which is otherwise available at law, by statute or otherwise. Each remedy shall be cumulative and in addition to every other remedy given hereunder or now or hereafter existing at law, by statute or otherwise.

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[6] ***DWF comment**: Please consider other widely understood bases such as 3/6/12 month KIBOR (Karachi Interbank Offering Rate), etc.*

The election of any one or more remedy by any of the Parties shall not constitute a waiver by such Party of the right to pursue any other remedy.

26.3. **Severance**

In the event that any provision of the Agreement is held by any judicial or other competent authority to be illegal, invalid or unenforceable that provision shall be severed to the extent necessary to make the Agreement enforceable, and it shall not affect or impair the validity, legality or enforceability of any of the other provisions of the Agreement.

1.7 **No Agency**

No provision of this Agreement shall be construed as constituting an agency, partnership, or joint venture between the Parties and neither Party shall have any express or implied authorities to bind the other Party in any way or to represent the other Party unless specifically provided to the contrary in this Agreement. The Concessionaire is an independent contractor performing the Agreement. The Concessionaire is not an employee or agent of TK.

1.8 **Corruption and Fraud**

The Concessionaire warrants that in entering into the Agreement it has not committed any Prohibited Act. In the event that the Concessionaire is contacted by a Public Official requesting or suggesting that the Concessionaire act in a manner which would constitute a Prohibited Act, the Concessionaire shall immediately provide TK in writing with full details of the request (including the identity of the Public Official making the request). In the event that the Concessionaire fails to comply with the requirements of this Clause 26.5 TK shall be entitled to terminate the Agreement pursuant to Clause 19 [*Termination*] of this Agreement.

1.9 **Entire Agreement**

This Agreement constitutes the entire agreement between the Parties in relation to all matters contained herein, including all understandings, rights, responsibilities, duties and obligations and supersedes all prior arrangements, representations, communications, negotiations, agreements and contracts (whether written or oral) made between or entered into by the Parties with respect thereto prior to the Effective Date. None of the Parties shall have any claim or right of action arising from any undertaking, representation or warranty not included in this Agreement.

1.10 **No Stipulation for the Benefit of a Third Person**

Save as is expressly provided for in this Agreement, no provision of this Agreement constitutes a stipulation for the benefit of a third person which, if accepted by the person, would bind any Party in favour of that person.

1.11 **Non-Waiver and Preservation of Remedies**

26.3.1. Subject to Clause 26.8.2 below, no relaxation, forbearance or delay by a Party in enforcing the Agreement will prejudice, affect or restrict the rights, responsibilities, obligations, powers or remedies of that Party nor shall any waiver by either Party of any such rights, responsibilities, obligations, powers or remedies, or of any breach of the Agreement, be deemed to be a waiver of any other right, responsibility, obligation, power or remedy, or of any later or continuing breach of, the Agreement.

26.3.2. Any waiver of a Party's rights, responsibilities, obligations, power or remedies arising out of, under or in connection with the Agreement shall be in writing, dated and signed by the representative of the Party granting such waiver, and shall specify the right, responsibility, obligation, power or remedy and the extent to which it is being waived. No waiver of a breach of a term of the Agreement operates as a waiver of any other breach of that term, or of a breach of any other term, of the Agreement.

1.12 No Representations

26.3.3. No Party may rely on any representation which allegedly induced that Party to enter into this Agreement, unless the representation is provided in this Agreement.

26.3.4. Specifically, TK does not warrant that (i) the Properties will, at the Commencement Date, comply with any rules, regulations or requirements applicable thereto; and (ii) the Concessionaire shall be granted any licence, consent or permit or any renewal thereof from any lawful authority as may be required in order for the Concessionaire to operate its business or for any change in respect of the use of the Properties which may be required by the Concessionaire.

1.13 Costs

Any costs, including all legal costs of an attorney and own client basis and taxes, incurred by a Party arising out of or in connection with a breach by another Party shall be borne by the Party in breach.

1.14 Change in Law

26.3.5. The Concessionaire acknowledges and agrees that it shall take full risk and responsibility for a Change in Law. Notwithstanding the foregoing, if a Change in Law occurs or is imminent that affects the rights and obligations of the Concessionaire under this Agreement, the Concessionaire shall notify TK within fourteen (14) days of the date of such Change in Law occurring or (if earlier) coming to the attention of the Concessionaire and the Parties shall discuss the effects of the Change in Law and endeavour to arrive at a resolution.

26.3.6. Any resolution reached between the Parties shall be recorded in writing and such record shall be signed by both Parties.

1.15 Independent Advice

Each of the Parties hereby respectively agrees and acknowledges that:

26.3.7. it has been free to secure independent legal advice as to the nature and effect of each provision of this Agreement and that it has either taken such independent legal advice or has dispensed with the necessity of doing so; and

26.3.8. each provision of this Agreement (and each provision of the Schedules) is fair and reasonable in all the circumstances and is part of the overall intention of the Parties in connection with this Agreement.

1.16 Survival of rights, duties and obligations

The Surviving Provisions will survive termination or completion of the Agreement.

1.17 Good Faith

The Parties shall, at all times, act in good faith towards each other and shall not bring the other Party into disrepute.

This Agreement has been executed on the date stated at the beginning of this Agreement.

[*Insert Execution Blocks*[7]]

---

[7] ***DWF comment***: *Please note that for evidentiary reasons under Pakistan Law, provision should be made for two male witnesses (or one man and two women) next to the signature blocks. Please ensure that this formality is adhered to in all agreements (including licence/lease agreements).*

SCHEDULE 1

TRANSACTION ADDENDUM[8]

DETAILS OF THE PARTIES	
TRANSKARACHI, a company existing under the laws of Pakistan, licenced under Section 42 of the Companies Act, 2017, with company registration number [●], whose registered office is at [●] ("**TK**" which expression shall include its successors-in-interest and permitted assigns)	[●], a company incorporated in [●], with company registration number [●], whose registered office is at [●] (the "**Concessionaire**")
CONCESSION RIGHT AND PROPERTIES	
The Parties acknowledge that this Transaction Addendum forms part of the Concession Agreement for Commercial Activities executed by the Parties on [●] (the "**Agreement**"). Except to the extent that the context requires otherwise, the defined terms used herein shall have the same meanings as in the Agreement.	
Whereas the Parties have entered into the Agreement, TK hereby grants the Concession Right to the Concessionaire in respect of the following Properties:	[*include a detailed description of the relevant Property together with the registration number, an excerpt from the respective register and a relevant plan, etc.*]
The Properties are located at the following location(s):	[●] [*mark on a map and include photos*]
The Parties entered into a relevant Property Use Agreement in accordance with the Agreement on:	[●]
Commencement Date:	[●]
FINANCIAL MATTERS	
Amount of the Rental:	[●]
Turnover Rental Percentage:	[●]

---

[8] ***DWF comment****: The Concession Agreement is a framework agreement which contains all essential terms and principles of the concession for commercial activities. Due to a significant variation of the Properties (e.g., commercial buildings and individual shops at underpasses, etc.), we cannot possibly envisage all of them in the text of the Concession Agreement, let alone describe the specific provisions with respect to each Property (such as its address, amount of the Rental for that Property, etc.). In order to avoid a situation of having to make amendments to the Concession Agreement all the time, we suggest instead using a Transaction Addendum/Addenda (substantially in the form described in Schedule 1), which will constitute part of the Concession Agreement (one can compare them with individual purchaser orders for large supply agreements). You can describe all of the Properties in one Addendum (with a single Rental amount, etc.) or execute separate Addenda for different Properties. If you decide to add new Properties, you will be able to execute additional Addenda which will all form part of the Concession Agreement.*

Utilities and other services:	[●]
Disincentive Fees:	• Failure to maintain the Properties in a clean and orderly manner after the first warning from TK – PKR [●]; • Use of any area not included in the Transaction Addendum or other Transaction Addenda – PKR [●]; • Failure to timely submit financial reports as per the Agreement – PKR [●]; • Failure to comply with health and safety obligations after the first warning from TK – PKR [●]; • [●]
[●]	
[●]	[●]
[●]	[●]
[●]	[●]

SCHEDULE 2
GUARANTEE FORMS

PARENT COMPANY GUARANTEE

(*To be printed on judicial stamp paper of prescribed fee)*

[*Insert name of Parent Company*]

(GUARANTOR)

IN FAVOUR OF

TRANSKARACHI

(TK)

PARENT COMPANY GUARANTEE

THIS PARENT COMPANY GUARANTEE (the "**Guarantee**") is made on [*Insert date*]

BETWEEN:

(1) **TRANSKARACHI**, a company existing under the laws of Pakistan, licenced under Section 42 of the Companies Act, 2017, with company registration number [●], whose registered office is at [●] ("**TK**" which expression shall include its successors-in-interest and permitted assigns); and

(2) [***Insert name of the Parent Company***], a company incorporated in [●], with company registration no. [●] and whose registered address is at [●] (the "**Guarantor**").

TK and the Guarantor are individually referred to herein as a "**Party**" and collectively as the "**Parties**".

WHEREAS:

A. [*Insert name of the Concessionaire*] (the "**Concessionaire**") has been awarded by TK an agreement relating to concession for commercial activities at various properties owned by TK (the "**Agreement**").

B. The Concessionaire is a [*State relationship with the Guarantor (branch, subsidiary, affiliate or other relationship*)] of the Guarantor] / [The Concessionaire is an Association of Persons and [*Insert name of member of the Concessionaire*] (the "**Member**") is a [*State relationship with the Guarantor (branch, subsidiary, affiliate or other relationship*)] of the Guarantor.]

C. Under the Agreement, the Concessionaire is required to procure a parent company guarantee from its parent company to guarantee the Concessionaire's performance of its duties and obligations arising under, out of or in connection with the Agreement.

D. The Guarantee is being delivered by the Concessionaire to TK in fulfilment of the Concessionaire's obligation to deliver a parent company guarantee to TK under the Agreement.

E. The Agreement is entered into by TK in reliance upon the undertakings of the Guarantor to TK contained in the Guarantee.

NOW THE GUARANTEE PROVIDES:

1. PRELIMINARY MATTERS

1.1 **Definitions and Interpretation**

The defined words and expressions set out in Clause 1 of Appendix 1 (*Definitions and Interpretation*) to the Guarantee and the provisions relating to the construction and interpretation of the Guarantee set out in Clause 2 of Appendix 1 (*Definitions and Interpretation*) to the Guarantee shall apply to the Guarantee.

2. **GUARANTEES AND INDEMNITIES**

2.1 **Guaranteed Obligations**

2.1.1 The Guarantor irrevocably and unconditionally guarantees the performance and discharge by the Concessionaire of the Guaranteed Obligations at the times and in the manner provided or contemplated in the Agreement.

2.1.2 Except as otherwise expressly provided in the Guarantee, the Guarantee shall not impose on the Guarantor any duties, obligations or liabilities greater than those assumed by the Concessionaire under the Agreement.

2.1.3 The Guarantee shall be binding upon the successors and assignees of the Guarantor and shall extend to and ensure for the benefit of the successors or assignees of TK.

2.2 Indemnity by Guarantor

2.2.1 If the Guaranteed Obligations are, or become, unenforceable, invalid or illegal (in whole or in part), the Guarantor indemnifies and holds harmless TK, its personnel and agents, in full against and from any and all liabilities, claims, damages, loss, expenses and costs (including legal fees and expenses) which arise out of, under or in relation to any failure of the Concessionaire to perform or discharge any or all of the Guaranteed Obligations.

2.2.2 The Guarantor, as separate and independent obligation from its duties, obligations and liabilities under Clause 2.2.1, indemnifies and holds harmless TK, its personnel and agents, in full against and from any and all liabilities, claims, damages, loss, expenses and costs (including legal fees and expenses) which arise out of, under or in relation to, any failure of the Concessionaire to perform or discharge any or all of the Guaranteed Obligations.

2.3 Additional Security

2.3.1 The Guarantee shall be in addition to, and independent of, any other security which TK may hold from time to time in respect of the discharge and performance by the Concessionaire of its duties, obligations and liabilities (including the Guaranteed Obligations) arising out of, under or in relation to with the Agreement.

2.4 Payment

2.4.1 The Guarantor agrees to make any payment due hereunder upon first written demand without set-off, deduction or counterclaim and without any legal formality such as protest or notice being necessary and waives all privileges or rights which it may have as a guarantor, including any right to require TK to claim payment or to exhaust remedies against the Concessionaire or any other person.

2.4.2 Any payment made under the Guarantee shall be made free and clear of, and without deduction for or on account of, any present or future taxes, levies, imposts, duties, charges, fees, deductions or withholdings of any nature whatsoever and by whomsoever imposed.

3. RIGHTS AND OBLIGATIONS

3.1 Waiver of Defences

3.1.1 The duties, obligations and liabilities of the Guarantor under the Guarantee shall not be reduced, discharged or otherwise adversely affected by:

a) any act, omission, matter or thing which would have discharged or affected the liability of the Guarantor had it been a principal debtor and obligor instead of a Guarantor or indemnifier; or
b) anything done or omitted to be done by any person which, but for this provision, might operate to exonerate or discharge the Guarantor or otherwise reduce or extinguish its liability under the Guarantee.

3.2 **Rights and Obligations of the Guarantor**

3.2.1 The Guarantor agrees that TK shall not be obliged (and the Guarantor waives any right it may have to require TK (or any agent on its behalf)) to (i) take court, arbitral or other dispute resolution proceedings or to enforce any judgment or award against the Concessionaire; or (ii) pursue any other right or claim (including the enforcement of any other security held by TK) against any person, before claiming from the Guarantor under the Guarantee.

3.2.2 Subject to the limits of liability set out in the Agreement, if any, the Guarantor indemnifies and holds harmless TK, its personnel and agents, in full against and from any and all liabilities, claims, damages, loss, expenses and costs (including legal fees and expenses) which TK incurs in connection with: (i) the preservation, exercise and/or enforcement of any rights arising out of, under or in relation to the Guarantee or any attempt so to do; and (ii) any discharge or release of the Guarantee.

3.2.3 Until all amounts which are or may become due from the Concessionaire under the Agreement have been irrevocably paid in full, or unless TK directs otherwise in writing, the Guarantor shall not exercise any security or other rights which it may have against the Concessionaire by reason of performance by it of its obligations under the Guarantee, whether such rights arise by way of set-off, counterclaim, subrogation, indemnity or otherwise.

3.3 **No Reduction of Obligation**

3.3.1 The duties, obligations and liabilities of the Guarantor under the Guarantee shall not be reduced or discharged by any:

a) alteration in the relationship between the Guarantor and the Concessionaire; or
b) arrangements between the Concessionaire and TK; or
c) amendments to the provisions of the Agreement; or
d) alteration, with or without the knowledge or consent of the Guarantor:
    i. in the extent or nature of the services to be performed under the Agreement; and/or
    ii. to the time for performance of the Concessionaire’s duties and obligations; and/or
    iii. to any other duties, obligations or liabilities of the Concessionaire arising under, out of or in connection with the Agreement; or
e) forbearance or indulgence by TK towards the Concessionaire or the Guarantor, whether as to payment, time, performance or otherwise; or
f) other act or omission which, but for this provision, might exonerate or discharge the Guarantor from liability under the Guarantee; or
g) invalidity or unenforceability of the Agreement or the insolvency, bankruptcy, winding up or reorganisation of the Concessionaire or any other person.

3.3.2 The Guarantor agrees that the Concessionaire and TK may do or agree to any of the matters referred to in Clause b), Clause c), Clause d) or Clause e), all of which shall be likewise guaranteed by the Guarantor in accordance with the provisions of the Guarantee.

4. COMMENCEMENT AND EXPIRY

4.1 Commencement and Operation of the Guarantee

4.1.1 The Guarantee shall come into effect when the Agreement comes into effect.

4.1.2 Without prejudice to Clause 4.1.1, the Guarantee shall come into effect in favour of TK as soon as it has been executed by the Guarantor, notwithstanding that TK may not have executed the Guarantee and in such case the Guarantee shall take effect as a unilateral declaration by the Guarantor in favour of TK and shall be deemed accepted by TK.

4.2 Expiry

4.2.1 The Guarantee shall continue in full force and effect until all duties, obligations and liabilities of the Concessionaire arising under, out of or in connection with the Agreement have been fully performed and discharged in accordance with the provisions thereof, at which time the Guarantee shall expire and be returned to the Guarantor.

5. NOTICES, DEMANDS OR OTHER COMMUNICATIONS

5.1 Form of Notice

5.1.1 Any notice, demand or other communication under or pursuant to the Guarantee shall be (i) in English; and (ii) in writing; and (iii) state the Clause under or pursuant to which the notice, demand or other communication is given, issued or made.

5.1.2 Subject to Clause 5.2.4, and except as otherwise expressly provided in the Guarantee, all notices, demands or other communications shall be delivered or transmitted by hand, registered courier or electronic transmission (being either facsimile or email) to the Contact Details of the addressee.

5.2 Delivery and Receipt

5.2.1 Where a notice, demand or other communication is delivered by electronic transmission, the sender shall, within seven (7) Days after the electronic transmission is delivered, deliver a copy of the electronic transmission by hand or registered courier to the Contact Details of the addressee.

5.2.2 Subject to Clause 5.2.3, a notice, demand or other communication shall be deemed to be duly given to the addressee: (i) in the case of facsimile transmission, on the date and at the time shown on the transmission report by the machine from which the facsimile was sent, subject to the machine producing a report that the facsimile was sent in its entirety to the Contact Details of the addressee; and (ii) in the case of email: at the time of receipt by the sender of an email acknowledgement from the intended addressee's information system showing that the email has been delivered to the email address of that addressee; or if no email acknowledgement is received, then at the time the email enters an information system which is under the control of the intended addressee (and the addressee shall make available at the request of the sender, evidence of such time); and (iii) in the case of delivery by hand or registered courier, at the time of and on the date of delivery.

5.2.3 In the event that a notice, demand or other communication is received after 3:00 pm at the physical address of the addressee stated in its Contact Details, it shall be taken to have been received by the addressee at 8:00 am on the next Day.

5.2.4 The Parties may each change their respective Contact Details for the purposes of Clause 5.1 by giving notice to each other in accordance with the procedures for the giving, issuing or making of communications set forth in Clause 5.1 not less than fourteen (14) Days before such change is to take effect. Any notice of such new Contact Details shall only be effective for the purposes of Clause 5.1 after it is deemed received pursuant to Clause 5.2.2 and Clause 5.2.3.

6. DISPUTE RESOLUTION

6.1 Disputes under the Agreement

The settlement or resolution of any dispute arising under, out of or in connection with the Agreement shall be final and binding on the Parties and the Parties shall not reopen, revisit or otherwise dispute that settlement or resolution and the subject matter of that settlement or resolution.

6.2 Dispute Resolution

6.2.1 A Party may refer any dispute arising out of, under or in connection with the Guarantee to the Pakistani court of competent jurisdiction.

6.2.2 Without prejudice to Clause 6.2.1, nothing in the Guarantee shall prevent the Parties from referring a dispute to arbitration by mutual written agreement.

7. GENERAL PROVISIONS

7.1 Governing Law and Language

7.1.1 The Guarantee shall be governed by, interpreted and construed in accordance with the Laws of the Islamic Republic of Pakistan.

7.1.2 Unless expressly notified in advance by TK, the primary language of the Guarantee shall be English. All communications issued between the Parties shall be in English. Unless expressly notified in advance by TK, all meetings shall be conducted in English, and minutes of meetings shall be issued in English.

7.2 Entire Agreement

The Guarantee constitutes the entire agreement between the Parties in relation to all matters contained herein, including all understandings, rights, responsibilities, duties and obligations and supersedes all prior arrangements, representations, communications, negotiations, agreements and contracts (whether written or oral) made between or entered into by the Parties with respect thereto prior to the date hereof.

7.3 Severability

7.3.1 In the event that any provision of the Guarantee is held by any judicial or other competent authority to be illegal, invalid or unenforceable that provision shall be severed to the extent necessary to make the Guarantee enforceable, and it shall not affect or impair the validity, legality or enforceability of any of the other provisions of the Guarantee.

7.4 Amendment

7.4.1 No modification, amendment, addendum or variation to the provisions of the Guarantee shall be effective or binding, unless it (i) is made in writing; and (ii) expressly sets out the modification, amendment, addendum or variation to the provisions of the Guarantee; and (iii) refers to the Guarantee; and (iv) is signed and dated by a representative of each Party.

7.5 Waiver

7.5.1 Subject to Clause 7.5.2, no relaxation, forbearance or delay by a Party in enforcing the Guarantee will prejudice, affect or restrict the rights, responsibilities, obligations, powers or remedies of that Party nor shall any waiver by either Party of any such rights, responsibilities, obligations, powers or remedies, or of any breach of the Guarantee, be deemed to be a waiver of any other right, responsibility, obligation, power or remedy, or of any later or continuing breach of, the Guarantee.

7.5.2 Any waiver of a Party’s rights, responsibilities, obligations, power or remedies arising out of, under or in connection with the Guarantee shall be in writing, dated and signed by the Representative of the Party granting such waiver, and shall specify the right, responsibility, obligation, power or remedy and the extent to which it is being waived. No waiver of a breach of a term of the Guarantee operates as a waiver of any other breach of that term, or of a breach of any other term, of the Guarantee.

7.6 Assignment

7.6.1 The Guarantor shall not assign, novate or transfer any of its rights or obligations under the Guarantee or any part of it.

7.6.2 Subject to giving the Guarantor seven (7) Days’ prior written notice, TK may assign, novate or transfer the Guarantee or any part of it or any benefit or interest in or under the Guarantee.

7.7 General Representations and Warranties

The Guarantor represents and warrants to TK that (i) it has full power and authority to enter into and perform its obligations under the Guarantee; and (ii) it has taken all necessary action to authorise the signing, delivery and performance of the Guarantee in accordance with its provisions; and (iii) the Guarantee constitutes the Guarantor's legal, valid and binding obligations and is enforceable in accordance with its provisions.

7.8 Limit on Reliance

No Party has entered into the Guarantee relying on any representation, warranty, promise or statement made by another Party, or any other person acting on behalf of a Party, other than the representations, warranties, promises and statements set out in the Guarantee.

7.9 Counterparts

The Guarantee may be executed in any number of counterparts, each of which, when executed, shall constitute a duplicate original, but all the counterparts shall together constitute one Guarantee.

SIGNED for and on behalf
of TransKarachi

________________________________ Witness: ____________________

[*Insert name and position of signatory*] [*Insert name and position of witness*]

SIGNED for and on behalf
of the Guarantor

________________________________ Witness: ____________________

[*Insert name and position of signatory*] [*Insert name and position of witness*]

APPENDIX 1

DEFINITIONS AND INTERPRETATION

1. **Definitions**

1.1 In this Guarantee the following words and expressions shall have the meanings set out below:

1.1.1 “**Agreement**” has the meaning given to it in recital A.

1.1.2 “**Association of Persons**” means an unincorporated joint venture, partnership, consortium or other association of two (2) or more persons.

1.1.3 “**Clause**” means a clause of this Guarantee.

1.1.4 "**Concessionaire**" has the meaning given to it in recital A.

1.1.5 “**Contact Details**” means the contact details of a Party stated in Appendix 2 (*Agreement Particulars*) or such other contact details as may be notified pursuant to Clause 5.2.4.

1.1.6 “**Guarantee**” means this parent company guarantee, including the recitals and Appendix 1 (*Definitions and Interpretation*) and Appendix 2 (*Agreement Particulars*).

1.1.7 “**Guaranteed Obligations**” means the duties and obligations of the Concessionaire arising under, out of or in connection with the Agreement, including the discharge of any indebtedness, monies and/or liabilities due, owing or incurred by the Concessionaire to TK arising under, out of or in connection with the Agreement.

1.1.8 “**Law**” means all national or public legislation, decrees, ordinances, rules and regulations relevant to this Guarantee as issued and in force within the Islamic Republic of Pakistan.

1.1.9 [“**Member**” has the meaning given to it in recital B. **delete if the Concessionaire is a single entity*]

2. **Interpretation**

2.1 In this Guarantee:

2.1.1 Clause headings are for convenience only and shall not be taken into consideration in the interpretation of this Guarantee.

2.1.2 The following rules shall apply to the interpretation of this Guarantee:

a) the singular shall include the plural and vice versa;

b) a reference to a gender shall include the other genders;

c) a reference to a law shall include that law as amended, consolidated, re-enacted or replaced from time to time;

d) a reference to "**Days**" means calendar days;

e) the word "**person**" shall include a natural person and any body or entity whether incorporated or not;

f) the words "**written**" or "**in writing**" shall include any communication sent by letter, facsimile transmission or email;

g) wherever "**include**" or any form of that word is used, it shall be construed as if it were followed by "**without being limited to**"; and

h) a reference to an "**agent**" shall mean any person with a contractual relationship with a Party and carrying out activities or obligations on behalf of that Party;

i) a reference to "**time**" shall be a reference to time in Karachi, Islamic Republic of Pakistan.

APPENDIX 2

AGREEMENT PARTICULARS

Contact Details

For TK:

TransKarachi
<Address line1>
<Address line2>
<Address line3>
Tel: *<Insert TK's telephone number>*
Fax: *<Insert TK's fax number>*
Email: *<Insert TK's email address>*
For the Attention of <__________________>

For the Guarantor:

<Insert Guarantor's Name>
<Address line1>
<Address line2>
<Address line3>
Tel: *<Insert Guarantor's telephone number>*
Fax:*<Insert Guarantor's fax number>*
Email:*<Insert Guarantor's email address>*
For the Attention of <__________________>

PERFORMANCE GUARANTEE

[*To be printed on judicial stamp paper of prescribed fee*]

[*To be issued on judicial paper of prescribed fee by bank licensed to conduct business in the Islamic Republic of Pakistan*]

This Performance Guarantee No. [*Insert No.*] is made on [*Insert date*] (the "**Guarantee**").

Ref: Property Management Concession Agreement dated [*Insert date*] (the "**Agreement**").

Beneficiary: TransKarachi, a company existing under the laws of Pakistan, licenced under Section 42 of the Companies Act, 2017, with company registration number [●], whose registered office is at [●] ("**TK**" which expression shall include its successors-in-interest and permitted assigns).

1. GUARANTEE

1.1 We [*Insert name of Bank*] (the "Guarantor") have been informed that [*Insert name of the Concessionaire*] (the "Concessionaire") has been awarded the Agreement relating to concession for commercial activities at various properties owned by TK.

1.2 The Guarantor hereby irrevocably and unconditionally undertakes to pay to TK on its first demand, without regard to any objections or defences to TK's demand from the Concessionaire or any other person, an amount or amounts not exceeding in total PKR [*Insert amount*].

2. TIME FOR PAYMENT

Any amount demanded by TK shall be paid by the Guarantor to TK within [two (2) business days] of receipt of the TK's demand for payment stating that the Concessionaire is in breach of its obligations arising under, out of or in connection with the Agreement, and the Guarantor shall have neither the right nor the duty or obligation to challenge the accuracy or sufficiency of such statement or the amount specified in the demand. For the purposes of this Guarantee, a "business day" means any day other than a Saturday, Sunday or public holiday in the Islamic Republic of Pakistan.

3. VALIDITY OF GUARANTEE

This Guarantee shall come into force on the date hereof and shall remain valid until [*Insert date*] whereupon this Guarantee shall expire and be returned to the Guarantor.

4. PAYMENT FREE OF DEDUCTIONS AND WITHHOLDINGS

Any payment under this Guarantee shall be made free and clear of, and without deduction for or on account of, any present or future taxes, levies, imposts, duties, charges, fees, deductions or withholdings of any nature whatsoever and by whomsoever imposed.

5. NOTICES AND DEMANDS FOR PAYMENT

5.1 Any demand for payment made under this Guarantee shall be delivered by hand or registered courier and be deemed to be duly made at the time of, and on the date of, delivery.

5.2 Any notice given under this Guarantee shall be deemed to be duly given:

a) in the case of facsimile transmission, on the date and at the time shown on the transmission report by the machine from which the facsimile was sent, subject to the machine producing a report that the facsimile was sent in its entirety to the contact details of the addressee stated in Appendix A (the "**Contact Details**") hereto;

b) in the case of email:
   i. at the time of receipt by the sender of an email acknowledgement from the intended addressee's information system showing that the email has been delivered to the email address of that addressee; or
   ii. if no email acknowledgement is received, then at the time the email enters an information system which is under the control of the intended addressee (and the addressee shall make available at the request of the sender, evidence of such time); and

c) in the case of delivery by hand or registered courier, at the time of and on the date of delivery.

5.3 Any notice or demand given or made by TK or the Guarantor relating to this Guarantee shall be in English.

6. ASSIGNMENT

TK shall have the right to assign the rights and benefits under this Guarantee.

7. DISPUTE RESOLUTION

This Guarantee shall be governed by, interpreted and construed in accordance with the laws of the Islamic Republic of Pakistan. Each Party consents to the jurisdiction of the courts in the Islamic Republic of Pakistan.

EXECUTED for and on behalf of
[*GUARANTOR*]

……………………………………………

(signed)

……………………………………………

Name

Witnesses:

APPENDIX A

CONTACT DETAILS

For TK:

TransKarachi
<Address line1>
<Address line2>
<Address line3>
Tel: *<Insert TK’s telephone number>*
Fax: *<Insert TK’s fax number>*
Email: *<Insert TK’s email address>*
For the Attention of <__________________>

For the Guarantor:

<Insert Guarantor’s Name>
<Address line1>
<Address line2>
<Address line3>
Tel: *<Insert Guarantor’s telephone number>*
Fax:*<Insert Guarantor’s fax number>*
Email:*<Insert Guarantor’s email address>*
For the Attention of <__________________>

SCHEDULE 3

PROPERTY DOCUMENTS

[●]

SCHEDULE 4

PROPERTY USE AGREEMENTS

[***Note to TransKarachi****: Please see below two forms of the Property Use Agreements – (1) a lease agreement; and (2) a licence in the context of business premises.*

Please note that you will need to choose one or another property use agreement depending on the Property and the rights that can be conferred to the Concessionaire. A ***lease*** *is the grant of a right to the exclusive possession of land/premises for a determinable period of time. A person has exclusive possession if it can exercise the rights of the landowner and exclude both the landlord and third parties from the land/premises (except to the extent that the landlord has reserved rights of entry, for example to carry out works). A* ***licence*** *is simply permission for a licensee to do something on a licensor's property. The permission given to the licensee prevents the permitted act from being a trespass. A licence entitling the licensee to use the land for the purpose authorised by the licence does not create an estate in land.*

The fact that an agreement purports to create a licence does not mean that it will be construed as a licence, and not a lease – the court will always look at the substance as well as the form of the agreement in deciding whether an agreement is a licence or a lease.]

PART I
LICENCE[9]

THIS LICENCE (the “**Licence**”) is made on [*Insert date*]

BETWEEN:

(1) **TRANSKARACHI**, a company existing under the laws of Pakistan, licenced under Section 42 of the Companies Act, 2017, with company registration number [●], whose registered office is at [●] (“**TK**" which expression shall include its successors-in-interest and permitted assigns); and

(2) a company incorporated in [●], with company registration number [●], whose registered office is at [●] (the "**Licensee**").

TK and the Licensee are individually referred to herein as a “**Party**” and collectively as the “**Parties**”.

WHEREAS:

(A) TK is the owner and operator of various properties, and has sought to put in place strategies which would best maximise the returns from those properties.

(B) The Licensee has been awarded by TK an agreement relating to the concession for commercial activities at the properties owned by TK (the "**Concession Agreement**").

(C) Under the Concession Agreement, the Licensee may fully commence exercising its concession right once the required conditions precedent have been fully satisfied and/or waived, as applicable. One of the conditions precedent that is required to be satisfied is execution by the Parties of the property use agreements for the use and maintenance of the relevant properties.

(D) TK wishes to grant a non-exclusive licence to the Licensee to utilise certain properties, described in Annex B (*Properties*) hereof (the "**Properties**"), and the Licensee wishes to use the Properties, in accordance with the terms and conditions of this Licence.

(E) As consideration for using the Properties, the Licensee hereby agrees to perform its obligations under the Concession Agreement.

NOW THE LICENCE PROVIDES:

PART A – GENERAL

1. Preliminary Matters

1.1 Definitions and Interpretation

1.1.1 The defined words and expressions set out in Clause 1 of Annex A (*Definitions and Interpretation*) hereof and the provisions relating to the construction and interpretation of the Licence set out in Clause 2 of Annex A (*Definitions and Interpretation*) hereof shall apply to the Licence.

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[9] ***DWF comment***: *To be printed on judicial stamp paper of prescribed fee.*

1.2 Effect of this Licence

1.2.1 The Parties hereby agree that this Licence shall immediately be binding on them as of the Effective Date.

1.3 Conditions Precedent

1.3.1 If the conditions precedent under the Concession Agreement remain unfulfilled (and/or are not waived) for an unreasonably long time (in the opinion of TK), then, save and except the Surviving Provisions, TK shall be entitled to consider this Licence null and void *ab initio* and TK shall be discharged from any and all liability that may have arisen or that may arise under this Licence.

PART B – PROPERTY USE AND MAINTENANCE OBLIGATIONS

2. Property Use

2.1 General

2.1.1 TK's signing this Licence shall indicate its consent to the grant of a non-exclusive licence to the Licensee for the Licensee's non-exclusive use of the Properties with the effect as of the Commencement Date.

2.1.2 TK permits the Licensee to occupy the Properties for the Permitted Use for the term specified in Clause 2.3 (*Commencement and Term*) of this Licence, in common with TK and all others authorised by TK, so far as is not inconsistent with the rights given to the Licensee to use the Properties for the Permitted Use.

2.1.3 The Licensee hereby agrees to use the Properties in accordance with the Permitted Use, the terms and conditions of the Licence and the Applicable Law, including all applicable environmental and health and safety regulations.

2.1.4 The Licensee acknowledges that:

(a) the Licensee shall occupy the Properties as a licensee and that no relationship of landlord and tenant is created between TK and the Licensee by this Licence;

(b) TK retains control, possession and management of the Properties and the Licensee has no right to exclude TK from the Properties;

(c) the non-exclusive licence to occupy the Properties, granted by this Licence, is personal to the Licensee and is not assignable[; and

(d) without prejudice to its rights under Clause 5 (*Breach and Termination*), TK shall be entitled at any time on giving not less than [●]' notice to require the Licensee to transfer to alternative space elsewhere and the Licensee shall comply with such requirement].

2.2 No payment

2.2.1 The Parties agree that the Licensee’s use of the Properties is required and/or necessary for the Licensee to be able to exercise its concession right and perform its obligations under the Concession Agreement.

2.2.2 Subject to Clause 2.2.3 below and to the extent not agreed otherwise by the Parties, the Licensee shall not be required to make any payments to TK for the use of the Properties. However, in consideration of the grant of the licence to use the Properties, the Licensee shall perform its obligations under the Concession Agreement.

2.2.3 To the extent that the use of the Properties pursuant to this Licence is taxable, the Licensee agrees to bear all taxes, charges, duties and/or tariffs by itself and, upon request from TK, provide proof that such obligations have been satisfied in full.

2.3 Commencement and Term

2.3.1 Notwithstanding the Effective Date, the Licensee shall commence using the Properties on the Commencement Date and shall continue using the Properties for the initial period of [one (1) year] (the "**Initial Term**"), unless this Licence is terminated earlier in accordance with the termination provisions hereof.

2.3.2 The Initial Term shall automatically be renewed for a renewal term of [one (1) year], unless at least [sixty (60) days] prior to the expiry of the Initial Term, either Party gives the other Party a written notice of its intention not to renew the Licence.

3. Hand-over of the Properties

3.1 At the time of the hand-over of the Properties, the Licensee and TK shall jointly carry out an inspection of the Properties. The state of the Properties shall be recorded in writing and that record shall be signed by TK and the Licensee.

4. Maintenance of the Properties

4.1 The Licensee agrees and undertakes:

(a) not to use the Properties other than for the Permitted Use;

(b) to keep the Properties clean, tidy and clear of rubbish;

(c) at all times during the term of this Licence, to ensure that the Properties are kept in a state of good repair and in a satisfactory operational condition (fair wear and tear excluded) and are maintained in accordance with the provisions of this Licence and the Concession Agreement;

(d) to keep detailed maintenance and repair records for the duration of this Licence. TK shall be entitled to audit such records upon giving the Licensee no less than twenty-four (24) hours' notice;

(e) not to make any alterations or additions whatsoever to the Properties, including electrical and plumbing installations, without TK's prior written approval;

(f) not to do or permit to be done on the Properties anything which is illegal or which may be or become a nuisance (whether actionable or not), annoyance, inconvenience or disturbance to TK and occupiers of the Properties or any owner, tenant or occupier of neighbouring properties;

(g) to refrain from interfering with the electrical or plumbing serving the Properties, except as may be strictly necessary to enable the Licensee to carry out its obligations of maintenance and repair under this Licence;

(h) not to cause or permit to be caused any damage to (i) the Properties or any neighbouring properties; and (ii) any property of TK or the occupiers of the Properties or any neighbouring properties;

(i) not to obstruct entrances and exits of the Properties, make them dirty or untidy or leave any rubbish on them;

(j) to comply with the Applicable Law and with any recommendations of the relevant suppliers relating to the supply and removal of electricity, gas, water, sewage, telecommunications and data and other services and utilities to or from the Properties;

(k) to observe any reasonable rules and regulations (governing the use of the Properties) TK makes and notifies to the Licensee from time to time;

(l) to leave the Properties in a clean and tidy condition and to remove the Licensee's equipment and goods from the Properties at the end of the Licence in accordance with the provisions of the Concession Agreement;

(m) to indemnify TK and keep TK indemnified against all losses, claims, demands, actions, proceedings, damages, costs, expenses or other liability in any way arising from: (i) this Licence; (ii) any breach of the Licensee's undertakings contained in this Clause 4.1; and/or (iii) the exercise of any rights described in Clause 2 (*Property Use*) of this Licence;

(n) [*Insert further obligations in respect of maintenance and safety of the specific Properties;*] and

(o) [*Insert further obligations and responsibility relating to construction, installation and other works (including the Licensee's responsibility for its contractors)*].

4.2 TK shall be entitled to conduct unscheduled inspections of the Properties (without any notice to the Licensee) to ensure that they continue to be in compliance with the Licence and are in satisfactory operational condition (fair wear and tear excluded). If the Properties are found not to be in compliance with the Licence or in unsatisfactory condition, TK shall immediately inform the Licensee and the Licensee shall, within a reasonable time or a time determined by TK, effect the required repairs/maintenance at its own cost.

4.3 In the event that the Licensee becomes aware of any defect or damage to the Properties, the Licensee shall immediately notify TK of such defect or damage and shall take all steps, at its own cost, as are in the circumstances reasonable to mitigate any risk to safety and any losses that TK would suffer or incur as a result of such defect or damage to the Properties. The Licensee shall take part in such meetings as may be necessary and otherwise coordinate and co-operate with TK to arrange for rectification or replacement (as appropriate) of defects, damage or loss to the Properties.

PART C – BREACH AND TERMINATION

5. Breach and Termination

5.1 If the Licensee commits a material breach of this Licence and fails to remedy the breach within fourteen (14) days after receipt from TK of a notice calling upon it to do so or such other time as specified by TK or agreed by the Parties, then TK shall be entitled, in addition to and without prejudice to any other right it may have under the Applicable Law or in accordance with this Licence, to seek specific performance of this Licence or to terminate the Licence on notice to the Licensee and in either event, to recover such damages and losses as it may have sustained.

5.2 For the purposes of this Licence, a material breach shall be if the Licensee:

(a) commits a material breach under the Concession Agreement; or

(b) delegates or sub-contracts this Licence or part thereof in contravention of the provisions hereof; or

(c) abandons the Properties or any of its obligations under the Licence; or

(d) consistently fails to observe any provision of this Licence (despite being given notice in relation thereto); or

(e) is liquidated, placed under business rescue or is sequestrated (whether provisionally or finally and whether voluntary or compulsorily); or

(f) effects a general compromise with its creditors or any other arrangement with its creditors, necessitated by the inability of the Licensee to pay its debts.

5.3 TK may at any time without prejudice to any other right it may have under the Applicable Law or in accordance with this Licence, terminate this Licence immediately upon notice to the Licensee if the Concession Agreement is terminated.

5.4 In the event of termination of the Licence:

(a) TK shall be entitled to immediately take possession of the Properties and the Licensee shall be required to do all things necessary to this effect, including returning to TK all keys and access cards; and

(b) the Licensee shall promptly cause the necessary repair or replacement to be effected to the Properties at the Licensee's own expense.

PART D – MISCELLANEOUS MATTERS

6 No warranties for use or condition

6.1 TK gives no warranty that the Properties possess all the necessary consents for the Permitted Use.[10]

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[10] ***DWF comment****: Please note that this is a standard provision that you might see in various common law contracts. And while the language can be retained as is, TK's failure to warrant any necessary permits in connection with use and suitability of the Properties may be seen as contrary to market customs/practice and this factor is likely to influence any decision on the enforcement of these provisions. An example would be where the licensee attempts to terminate the agreement on the grounds of unsuitability for purpose or hindrance in the use of the Properties.*

6.2 TK gives no warranty that the Properties are physically fit for the purposes specified in Clause 2 (*Property Use*) of this Licence.[11]

6.3 The Licensee acknowledges that it does not rely on, and shall have no remedies in respect of, any representation or warranty (whether made innocently or negligently) that may have been made by or on behalf of TK before the date of this Licence as to any of the matters mentioned in Clause 6.1 or Clause 6.2 above.

7. Limitation of TK's liability

7.1 Subject to Clause 7.2 below, TK is not liable for:

(a) the death of, or injury to the Licensee, its employees, customers or invitees to the Properties; or

(b) damage to any property of the Licensee or that of the Licensee's employees, customers or other invitees to the Properties; or

(c) any losses, claims, demands, actions, proceedings, damages, costs or expenses or other liability incurred by Licensee or the Licensee's employees, customers or other invitees to the Properties in the exercise or purported exercise of the rights granted by Clause 2 (*Property Use*) of this Licence.

7.2 Nothing in Clause 7.1 above shall limit or exclude TK's liability for:

(a) death or personal injury or damage to property caused by gross negligence on the part of TK; or

(b) any matter in respect of which it would be unlawful for TK to exclude or restrict liability.

8. Disputes

8.1 For the purposes of this Clause 8, the term “dispute” shall be interpreted in its widest sense and shall include any dispute or difference in connection with or in respect of the conclusion or existence of this Licence, the carrying into effect of this Licence, the interpretation or application of the provisions of this Licence, the Parties’ respective rights and obligations in accordance with and arising out of this Licence or the validity, enforceability, rectification, termination or cancellation, whether in whole or in part, of this Licence.

8.2 Save as otherwise provided for in this Licence, any dispute between the Parties arising in connection with this Licence shall be resolved in accordance with the provisions of clause 25 (*Dispute Resolution*) of the Concession Agreement.

9. Addresses and notices

9.1 All notices under this Licence shall be made by the Parties in accordance with clause 23 (*Communications*) of the Concession Agreement.

10. Change in Law

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[11] ***DWF comment****: As above.*

10.1 The Licensee acknowledges and agrees that it shall take full risk and responsibility for a Change in Law occurring. Notwithstanding the foregoing, if a Change in Law occurs or is imminent that affects the rights and obligations of the Licensee under this Licence, the Licensee shall notify TK within fourteen (14) days of the date of such Change in Law occurring or (if earlier) coming to the attention of the Licensee, and the Parties shall discuss the effects of the Change in Law and endeavour to arrive at a resolution.

10.2 Any resolution reached between the Parties shall be recorded in writing and such record shall be signed by both Parties.

11. Remedies

11.1 No remedy conferred by this Licence is intended to be exclusive of any other remedy which is otherwise available at law, by statute or otherwise. Each remedy shall be cumulative and in addition to every other remedy given hereunder or now or hereafter existing at law, by statute or otherwise. The election of any one or more remedy by any of the Parties shall not constitute a waiver by such Party of the right to pursue any other remedy.

12. Confidentiality

12.1 Each Party shall at all times keep in confidence the Confidential Information of the other Party which it may acquire for the purposes of or in connection with this Licence (whether prior to or after the Commencement Date) and shall not use or permit the use of such Confidential Information and shall procure that its employees shall not use the Confidential Information, for any other purpose and shall not disclose such Confidential Information to any third party.

12.2 Notwithstanding Clause 12.1 above, a Party may disclose the Confidential Information of the other Party to such former Party’s employees or authorised representatives to the extent that such employees or authorised representatives need to know the Confidential Information and shall ensure that such employees or authorised representatives are aware of and comply with, the confidentiality obligations contained in this Clause 12.

12.3 Each Party shall take all such steps as may be reasonably necessary to prevent the Confidential Information of the other Party from falling into the hands of an unauthorised third party.

12.4 The Licensee shall not make any comments to the media relating to this Licence and any related matter nor shall it respond to any queries from the media without the prior written approval of TK.

13. Severance

13.1 In the event that any provision of the Licence is held by any judicial or other competent authority to be illegal, invalid or unenforceable that provision shall be severed to the extent necessary to make the Licence enforceable, and it shall not affect or impair the validity, legality or enforceability of any of the other provisions of the Licence.

14. No agency

14.1 No provision of this Licence shall be construed as constituting an agency, partnership, or joint venture between the Parties and neither Party shall have any express or implied intention to bind the other Party in any way or to represent the other Party unless specifically provided to the contrary in this Licence.

14.2 The Licensee is an independent contractor performing this Licence. The Licensee is not an employee or agent of TK.

15. Corruption and Fraud

15.1 The Licensee warrants that in entering into the Licence it has not committed any Prohibited Act.

15.2 In the event that the Licensee is contacted by a Public Official requesting or suggesting that the Licensee act in a manner which would constitute a Prohibited Act, the Licensee shall immediately provide TK in writing with full details of the request (including the identity of the Public Official making the request).

15.3 Without prejudice to Clause 15.2 above, the Licensee shall ensure that its staff undertaking activities in connection with the Licence are subject to similar obligations to those set out in this Clause 15 and the Licensee shall enforce such obligations.

15.4 In the event that the Licensee fails to comply with the requirements of this Clause 15, TK shall be entitled to terminate the Licence pursuant to Clause 5 (*Breach and Termination*) of the Licence.

16. Entire Agreement

16.1 This Licence constitutes the entire agreement between the Parties in relation to all matters contained herein, including all understandings, rights, responsibilities, duties and obligations and supersedes all prior arrangements, representations, communications, negotiations, agreements and contracts (whether written or oral) made between or entered into by the Parties with respect thereto prior to the Effective Date. None of the Parties shall have any claim or right of action arising from any undertaking, representation or warranty not included in this Licence.

17. No stipulation for the benefit of a third person

17.1 Save as is expressly provided for in this Licence, no provision of this Licence constitutes a stipulation for the benefit of a third person which, if accepted by the person, would bind any Party in favour of that person.

18. No representations

18.1 A Party may not rely on any representation which allegedly induced that Party to enter into this Licence, unless the representation is provided in this Licence.

19. Amendment

19.1 Except as set out elsewhere in this Licence, no modification, amendment, addendum or variation to the Licence shall be effective or binding, unless it (i) is made in writing; and (ii) expressly sets out the modification, amendment, addendum or variation to the Licence; and (iii) refers to the Licence; and (iv) is signed and dated by an authorised representative of each Party.

20. Indulgences

20.1 The grant of any indulgence, extension of time or relaxation of any provision by a Party under this Licence shall not constitute a waiver of any right by the grantor or prevent or adversely affect the exercise by the grantor of any existing or future right of the grantor.

21. General co-operation

21.1 The Parties shall co-operate with each other and shall each execute and deliver to the other Party such other instruments and documents and take such other actions as may be reasonably requested from time to time in order to carry out, evidence and confirm their rights and the intended purpose of this Licence.

22. Governing law

22.1 This Licence is to be governed, interpreted and construed in accordance with the laws of the Islamic Republic of Pakistan.

23. Language

23.1 Unless expressly notified in advance by TK, the primary language of the Licence shall be English. All documents and communications issued between the Parties shall be in English. Unless expressly notified in advance by TK, all minutes of meetings shall be issued in English.

24. Independent advice

24.1 Each of the Parties hereby respectively agrees and acknowledges that: (i) it has been free to secure independent legal advice as to the nature and effect of each provision of this Licence and that it has either taken such independent legal advice or has dispensed with the necessity of doing so; and (ii) each provision of this Licence (and each provision of the Annexes) is fair and reasonable in all the circumstances and is part of the overall intention of the Parties in connection with this Licence.

25. Good faith

25.1 The Parties shall, at all times, act in good faith towards each other and shall not bring the other Party into disrepute.

26. Survival of rights, duties and obligations

26.1 The Surviving Provisions will survive termination or completion of the Licence.

26.2 In the event that the Licence is terminated or completed, neither Party shall be liable to the other Party except: (i) under the Surviving Provisions; or (ii) in respect of any breach of the Licence occurring before such termination or completion; or (iii) any rights or liabilities between the Parties that were pre-existing as at the date of termination or completion.

27. Waiver

27.1 Subject to Clause 27.2 below, no relaxation, forbearance or delay by a Party in enforcing the Licence will prejudice, affect or restrict the rights, responsibilities, obligations, powers or remedies of that Party nor shall any waiver by either Party of any such rights, responsibilities, obligations, powers or remedies, or of any breach of the Licence, be deemed to be a waiver of any other right, responsibility, obligation, power or remedy, or of any later or continuing breach of, the Licence.

27.2 Any waiver of a Party’s rights, responsibilities, obligations, power or remedies arising out of, under or in connection with the Licence shall be in writing, dated and signed by the representative of the Party granting such waiver, and shall specify the right, responsibility, obligation, power or remedy and the extent to which it is being waived. No waiver of a breach of a term of the Licence operates as a waiver of any other breach of that term, or of a breach of any other term, of the Licence.

28. Costs

28.1 Any costs, including all legal costs on an attorney and own client basis and taxes, incurred by a Party arising out of or in connection with a breach by another Party shall be borne by the Party in breach.

29. Transfer of rights

29.1 The Licensee cannot cede, assign, delegate, novate, sublet, charge or transfer any of its rights or obligations under the Licence, or any part of it, or any benefit or interest therein, to any person.

30. Registration

30.1 On execution of this Licence, if required by any Regulatory Body, TK shall register and/or attest this Licence with the appropriate Regulatory Body and provide all necessary information and documents to the relevant Regulatory Body. The Licensee shall provide reasonable assistance to enable such registration and/or attestation.

This Licence has been executed on the date stated at the beginning of this Licence.

[*Insert Execution Blocks*]

ANNEX A

DEFINITIONS AND INTERPRETATION

1. Definitions

1.1 In the Licence, the following words and expressions shall have the meanings set out below:

1.1.1 "**Annexes**" means the annexes attached to this Licence;

1.1.2 "**Applicable Law**" means any constitution, statute, ordinance, treaty, decree, proclamation or subordinated legislation or other legislative measure, as amended from time to time, including all national and provincial statutes and legislation and all municipal by-laws, as well as the common law and customary law and any judgment, decision, order or rule of any court or tribunal with relevant jurisdiction and any decision made by judicial or administrative bodies in accordance with any of the aforegoing;

1.1.3 "**Business Day**" means any day other than a Saturday, Sunday or public holiday in the Islamic Republic of Pakistan;

1.1.4 "**Change in Law**" means: (a) the adoption of a new law; or (b) a change in or repeal of an existing law, which after the Effective Date results in: (i) a change in the taxes, duties or levies payable by the Licensee in respect of the use of the Properties; or (ii) a change in or the repeal of any other requirement for the performance of the obligations under this Licence;

1.1.5 "**Commencement Date**" means the date indicated as the Commencement Date in the service notice given to the Licensee by TK in accordance with clause 4.1 of the Concession Agreement;

1.1.6 "**Confidential Information**" means all information, without limitation, of whatsoever nature:

(a) relating to the Disclosing Party's business, operations, processes, drawings, sketches, plans, models, product information, know-how, market opportunities, customers and business affairs;

(b) relating to the relationship of the Disclosing Party with its customers and suppliers; or

(c) relating to the contents of this Licence and any other information received pursuant to this Licence,

but excludes information which:

(i) is required to be disclosed under any law or regulation, or by any Regulatory Body, including any stock exchange on which a Receiving Party may be listed, provided that the Receiving Party in question shall first consult with the Disclosing Party before making any such disclosure, statement or announcement; or

(ii) is in the public domain or enters into the public domain in any way, provided that the entry of such information into the public domain did not entail a breach of this Licence by the Receiving Party; or

(iii) the Receiving Party can show it was within its possession or knowledge, such information being in its use or having been recorded in its files, computers or other recording media, prior to receipt thereof from the Disclosing Party and which information was not previously acquired by the Receiving Party under any obligations of confidence or unlawfully; or

(iv) is disclosed by the Receiving Party with the prior written approval of the Disclosing Party; or

(v) was disclosed by the Disclosing Party to a third party without restriction on disclosure or use, including without limitation, by way of a patent specification; or

(vi) is hereafter disclosed or made available in good faith to the Receiving Party from a source other than the Disclosing Party, without breach by the Receiving Party of any obligation of confidentiality or non-use owed to the Disclosing Party or without breach by such other source who, to the knowledge of the Disclosing Party, is not subject to an obligation of confidentiality or non-use owed to the Disclosing Party; or

(vi) is developed independently by the Receiving Party without reference to the Confidential Information;

1.1.7 “**Concession Agreement**” means the agreement made on [•] between the Parties, whereby TK grants to the Licensee a[n exclusive] right to operate concession for commercial activities at certain properties;

1.1.8 “**Disclosing Party**” means the Party disclosing Confidential Information to the Receiving Party;

1.1.9 “**Effective Date**” means when this Licence has been signed by each Party, the latest of the dates upon which this Licence was signed by any Party;

1.1.10 "**Initial Term**" has the meaning given to it in Clause 2.3.1 of this Licence;

1.1.11 "**Licence**" means this Licence as amended from time to time, including the Annexes;

1.1.12 "**Licensee**" has the meaning given to it in Recital 2;

1.1.13 “**Party**” means a party to this Licence;

1.1.14 "**Permitted Use**" means the use of the Properties solely for the purposes of exercising the concession right granted to the Licensee by the Concession Agreement.

1.1.15 “**Prohibited Act**” means:

(a) offering, giving or agreeing to give to a Public Official a gift or consideration of any kind as an inducement or reward for:

(i) doing or not doing (or for having done or not having done) any act; or

(ii) showing or not showing (or for having shown or not shown) favour or disfavour to any person,

in relation to the award or performance of the Licence or any other agreement with TK; or

(b) entering into an agreement for which commission has been paid or has been agreed to be paid by the Licensee or on its behalf, or to its knowledge, unless before the relevant agreement is entered into, particulars of any such commission and of the terms of any such agreement for the payment thereof have been disclosed in writing to TK; or

(c) committing any offence under the Applicable Law creating offences in respect of fraudulent acts; or

(d) defrauding, attempting to defraud or conspiring to defraud TK;

1.1.16 “**Properties**” means certain properties owned and operated by TK in respect of which the Licensee has been granted a non-exclusive licence, as further described in Annex B (*Properties*);

1.1.17 “**Public Official**” means an official or employee of a government owned or controlled enterprise or any Regulatory Body and shall include any individual defined as a public official in the Applicable Law;

1.1.18 “**Receiving Party**” means the Party receiving Confidential Information from the Disclosing Party;

1.1.19 “**Regulatory Body**” means any governmental, semi-governmental, administrative, fiscal or judicial ministry, department, commission, authority, tribunal, agency, police, notary public or municipality, and shall include the provider of electricity, gas, water, wastewater, telecoms and other such public services, and any body with a regulatory function under the Applicable Law;

1.1.20 “**Surviving Provisions**” means Clause 1 (*Preliminary Matters*); Clause 5 (*Breach and Termination*); Clauses 6-30 (*Part D – Miscellaneous Matters*) and this Annex A;

1.1.21 "**TK**" has the meaning given to it in Recital 1.

2. Interpretation

2.1 In the Licence:

2.1.1 in the event of conflict between the Annexes and the provisions of the Licence (excluding the Annexes), the provisions of the Licence shall prevail;

2.1.2 any definition in this Licence, shall bear the same meaning and apply throughout this Licence including Annexes hereto, unless otherwise stated or inconsistent with the context in which it appears;

2.1.3 the singular includes the plural and vice versa;

2.1.4 a reference to a statutory provision includes any subordinate legislation made from time to time under that provision and includes those provisions as amended, consolidated, re-enacted or replaced from time to time;

2.1.5 a reference to a document includes the document as modified from time to time and any document replacing it, in each case in the manner permitted by the Licence;

2.1.6 a reference to a gender includes the other genders;

2.1.7 a reference to any government agency or body, if that agency or body ceases to exist or is reconstituted, renamed or replaced or has its powers or functions removed (“defunct body”), means the agency or body that performs most closely the functions of the defunct body;

2.1.8 a reference to an “agent” shall mean any person with a contractual relationship with a Party and carrying out activities or obligations on behalf of that Party;

2.1.9 references in this Licence to “Clauses” or to “Annexes”, are to clauses of and Annexes to this Licence;

2.1.10 references to notices or requests made or received by any of the Parties shall, unless expressly provided otherwise in this Licence, refer to notices or requests in writing;

2.1.11 references to "agree" or "agreed" shall require the agreement to be recorded in writing and signed by the authorised representatives of the Parties;

2.1.12 no rule of construction shall be applied to the disadvantage of a Party to this Licence because that Party was responsible for or participated in the preparation of this Licence or any part of it;

2.1.13 unless otherwise provided, any number of days prescribed shall be determined by excluding the first and including the last day or, where the last day falls on a day that is not a Business Day, the next succeeding Business Day;

2.1.14 references to day/s, month/s or year/s shall be construed as Gregorian calendar day/s, month/s or year/s, as the case may be;

2.1.15 if a definition imposes substantive rights and obligations on a Party, such rights and obligations shall be given effect to and shall be enforceable, notwithstanding that they are contained in a definition;

2.1.16 the use of the word "including" followed by a specific example/s shall not be construed as limiting the meaning of the general wording preceding it and it shall be construed as if it were followed by "without being limited to".

ANNEX B

PROPERTIES

[*Insert the description of the relevant Properties, including the registration numbers, addresses and maps/plans, if applicable*]

PART II
LEASE AGREEMENT[12]

THIS LEASE AGREEMENT (the "**Lease**") is made on [*Insert date*]

BETWEEN:

(1) **TRANSKARACHI**, a company existing under the laws of Pakistan, licenced under Section 42 of the Companies Act, 2017, with company registration number [●], whose registered office is at [●] ("**TK**" which expression shall include its successors-in-interest and permitted assigns); and

(2) a company incorporated in [●], with company registration number [●], whose registered office is at [●] (the "**Tenant**").

TK and the Tenant are individually referred to herein as a "**Party**" and collectively as the "**Parties**".

WHEREAS:

(A) TK is the owner and operator of various properties, and has sought to put in place strategies which would best maximise the returns from those properties.

(B) The Tenant has been awarded an agreement relating to the concession for commercial activities at the properties owned/operated by TK (the "**Concession Agreement**").

(C) Under the Concession Agreement, the Tenant may fully commence exercising its concession right once the required conditions precedent have been fully satisfied and/or waived, as applicable. One of the conditions precedent that is required to be satisfied is execution by the Parties of the property use agreements for the use and maintenance of the relevant properties.

(D) TK wishes to grant leasehold rights to the Tenant to use certain properties, described in Annex B (*Properties*) hereof (the "**Properties**"), which include rights, powers, benefits, privileges, authorisations and entitlements in relation to the Properties as set forth in this Lease.

NOW, THEREFORE, in consideration of the mutual terms, conditions, promises, covenants and payments hereinafter set forth, and other good and valuable consideration the receipt of which is hereby acknowledged, TK and the Tenant agree as follows:

PART A – GENERAL

1. Preliminary Matters

1.1 Definitions and Interpretation

1.1.1 The defined words and expressions set out in Clause 1 of Annex A (*Definitions and Interpretation*) hereof and the provisions relating to the construction and interpretation of the Lease set out in Clause 2 of Annex A (*Definitions and Interpretation*) hereof shall apply to the Lease.

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[12] ***DWF comment***: *To be printed on judicial stamp paper of prescribed fee.*

1.2 Effect of this Lease

1.2.1 The Parties hereby agree that this Lease shall immediately be binding on them as of the Effective Date.

1.3 Conditions Precedent

1.3.1 If the conditions precedent under the Concession Agreement remain unfulfilled (and/or are not waived) for an unreasonably long time (in the opinion of TK), then, save and except the Surviving Provisions, TK shall be entitled to consider this Lease null and void *ab initio* and TK shall be discharged from any and all liability that may have arisen or that may arise under this Lease.

PART B – PROPERTY USE AND MAINTENANCE OBLIGATIONS

2. Property Use

2.1 General

2.1.1 TK’s signing this Lease shall indicate its consent to the grant of leasehold rights to the Tenant for the Tenant's use of the Properties with the effect as of the Commencement Date.

2.1.2 TK permits the Tenant to occupy and use the Properties for the Permitted Use for the term specified in Clause 2.2 (*Commencement and Term*) of this Lease. The Tenant cannot require TK to grant the Lease to any person other than the Tenant.

2.1.3 The Tenant hereby agrees to use the Properties in accordance with the Permitted Use, the terms and conditions of the Lease and the Applicable Law, including all applicable environmental and health and safety regulations.

2.2 Commencement and Term

2.2.1 Notwithstanding the Effective Date, the Tenant shall commence using the Properties on the Commencement Date and shall continue using the Properties for the initial period of [one (1) year] (the "**Initial Term**"), unless this Lease is terminated earlier in accordance with the termination provisions hereof.

2.2.2 The Initial Term shall automatically be renewed for a renewal term of [one (1) year], unless at least [sixty (60) days] prior to the expiry of the Initial Term, either Party gives the other Party a written notice of its intention not to renew the Lease.

2.2.3 Notwithstanding anything to the contrary herein contained, the Tenant may only commence using the Properties upon payment of the Rent Deposit into the Rent Deposit Account, the details of which can be found in Annex C (*Rent Deposit and Rent Deposit Account*) of this Lease.

3. Hand-over of the Properties

3.1 At the time of the hand-over of the Properties, the Tenant and TK shall jointly carry out an inspection of the Properties. The state of the Properties shall be recorded in writing and that record shall be signed by TK and the Tenant.

3.2 The Tenant acknowledges that prior to the Effective Date, TK has given the Tenant the opportunity to inspect, survey and carry out investigations as to the condition of the Properties, and the Tenant accepts the condition of the Properties.

4. Maintenance of the Properties

4.1 The Tenant agrees and undertakes:

(a) not to use the Properties other than for the Permitted Use;

(b) to keep the Properties clean, tidy and clear of rubbish. The Tenant shall ensure regular collection of refuse and shall ensure transferring the refuse to the specified sites;

(c) to make sure that the Properties are properly maintained in accordance with the terms set out in the Concession Agreement;

(d) at all times during the term of this Lease, to ensure that the Properties are kept in a state of good repair and in a satisfactory operational condition (fair wear and tear excluded) and are maintained in accordance with the provisions of this Lease and the Concession Agreement;

(e) to keep detailed maintenance and repair records for the duration of this Lease. TK shall be entitled to audit such records upon giving the Tenant no less than twenty-four (24) hours' notice;

(f) not to make or allow to be made any alterations or additions whatsoever (including external, internal, structural or non-structural) to the Properties, including electrical and plumbing installations, without TK's prior written approval;

(g) not to do or permit to be done on the Properties anything which is illegal or which may be or become a nuisance (whether actionable or not), annoyance, inconvenience or disturbance to TK or any owner or occupier of neighbouring properties;

(h) to refrain from interfering with the electrical or plumbing serving the Properties, except as may be strictly necessary to enable the Tenant to carry out its obligations of maintenance and repair under this Lease;

(i) not to cause or permit to be caused any damage to (i) the Properties or any neighbouring properties; and (ii) any property of TK or the owners of any neighbouring properties;

(j) not to obstruct entrances and exits of the Properties, make them dirty or untidy or leave any rubbish on them;

(k) to comply with the Applicable Law and with any recommendations of the relevant suppliers relating to the supply and removal of electricity, gas, water, sewage, telecommunications and data and other services and utilities to or from the Properties;

(l) to observe any occupancy rules and regulations (governing the use of the Properties) TK makes and notifies to the Tenant from time to time;

(m) to leave the Properties in a clean and tidy condition and to remove the Tenant's equipment and goods from the Properties at the end of the term of the Lease in accordance with the provisions of the Concession Agreement;

(n) to indemnify TK and keep TK indemnified against all losses, claims, demands, actions, proceedings, damages, costs, expenses or other liability in any way arising from: (i) this Lease;

(ii) any breach of the Tenant's undertakings contained in this Clause 4.1; and/or (iii) the exercise of any rights described in Clause 2 (*Property Use*) of this Lease;

(o) to ensure the Properties are thoroughly secured and arrange and manage security for the Properties, as approved by TK;

(p) [*Insert further obligations in respect of maintenance and safety of the specific Properties;*] and

(q) [*Insert further obligations and responsibility relating to construction, installation and other works (including the Tenant's responsibility for its contractors)*].

4.2 TK shall be entitled to conduct unscheduled inspections of the Properties to ensure that they continue to be in compliance with the Lease and are in satisfactory operational condition (fair wear and tear excluded). If the Properties are found not to be in compliance with the Lease or in unsatisfactory condition, TK shall immediately inform the Tenant and the Tenant shall, within a reasonable time or a time determined by TK, effect the required repairs/maintenance at its own cost.

4.3 In the event that the Tenant becomes aware of any defect or damage to the Properties, the Tenant shall immediately notify TK of such defect or damage and shall take all steps, at its own cost, as are in the circumstances reasonable to mitigate any risk to safety and any losses that TK would suffer or incur as a result of such defect or damage to the Properties. The Tenant shall take part in such meetings as may be necessary and otherwise coordinate and co-operate with TK to arrange for rectification or replacement (as appropriate) of defects, damage or loss to the Properties.

4.4 The Tenant shall be entitled to decorate the Properties as often as is reasonable necessary for the exercise of its concession right under the Concession Agreement. All decoration shall be carried out in a good and proper manner using good quality materials that are appropriate to the Properties and the Permitted Use and shall include all appropriate preparatory work. Before the end of the term of this Lease, the Tenant shall remove any decorations placed by it at the Properties and shall make good any damage cause to the Properties by that removal.

4.5 [*If applicable, please insert respective provisions on insurance – it can be dealt with in one of two ways. First, the Tenant can be made to covenant to insure or, secondly, TK can agree to insure.*]

PART C – FINANCIAL MATTERS

5. Rental

5.1 As consideration for the grant by TK to the Tenant of the leasehold rights, the Tenant shall effect the Rental payment to TK each month as stated in the Concession Agreement. The Rental shall (i) be payable in arrear, on or before the last Business Day of each and every month; and (ii) be paid by debit order or electronic funds transfer to TK's bank account or any other payment method agreed to by TK, and without deductions, bank charges, set-off or exchange.

5.2 Upon such payment of the Rental, the Tenant shall furnish TK with documentary proof, reasonably satisfactory to TK, of having effected the same.

5.3 [In the event that the Rental due and owing by the Tenant to TK under this Lease is not paid promptly on due date, then such overdue amount shall, without prejudice to any other rights or remedies which may vest in TK, attract interest at the SBP[13] interest rate plus three (3) percent, from due date to date of payment. For the purposes of this Clause, "SBP interest rate" means the benchmark interest rate of the State Bank of Pakistan.]

5.4 The Rental shall never be less than that stipulated in the transaction addenda to the Concession Agreement. The Tenant further acknowledges (and waives its statutory rights with respect to increase in the Rental) that the Rental shall escalate on each anniversary of the Commencement Date by [●].

6. Taxes, Duties and Fees

6.1 To the extent that the use of the Properties pursuant to this Lease is taxable, the Tenant agrees to bear all taxes, charges, duties and/or tariffs by itself and, upon request from TK, provide proof that such obligations have been satisfied in full.

6.2 The Tenant shall pay and indemnify TK against all taxes, duties, assessments, impositions, charges and other outgoings of any type payable in respect of the execution of the Lease and use of the Properties.

7. Utilities

7.1 In addition to the Rental payable, the Tenant shall pay all costs associated with any Utilities including in connection with the supply, consumption and/or removal of Utilities to and from the Properties.

PART D – BREACH AND TERMINATION

8. Breach and Termination

8.1 If the Tenant commits a material breach of this Lease and fails to remedy the breach within fourteen (14) days after receipt from TK of a notice calling upon it to do so or such other time as specified by TK or agreed by the Parties, then TK shall be entitled, in addition to and without prejudice to any other right it may have under the Applicable Law or in accordance with this Lease, to seek specific performance of this Lease or to terminate the Lease on notice to the Tenant and in either event, to recover such damages and losses as it may have sustained.

8.2 For the purposes of this Lease, a material breach shall be if the Tenant:

(a) commits a material breach under the Concession Agreement; or

(b) delegates or sub-contracts this Lease or part thereof in contravention of the provisions hereof; or

(c) abandons the Properties or any of its obligations under the Lease; or

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[13] ***DWF comment**: Please consider other widely understood bases such as 3/6/12 month KIBOR (Karachi Interbank Offering Rate), etc.*

(d) consistently fails to observe any provision of this Lease (despite being given notice in relation thereto); or

(e) is liquidated, placed under business rescue or is sequestrated (whether provisionally or finally and whether voluntary or compulsorily); or

(f) effects a general compromise with its creditors or any other arrangement with its creditors, necessitated by the inability of the Tenant to pay its debts.

8.3 TK may at any time without prejudice to any other right it may have under the Applicable Law or in accordance with this Lease, terminate this Lease immediately upon notice to the Tenant if the Concession Agreement expires or is terminated.

8.4 In the event of termination or expiration of the Lease:

(a) TK shall be entitled to immediately take possession of the Properties and the Tenant shall be required to do all things necessary to this effect, including returning to TK all keys and access cards;

(b) the Tenant shall promptly cause the necessary repair or replacement to be effected to the Properties at the Tenant's own expense; and

(c) any sites, equipment or other Tenant's property not removed within ten (10) days after the termination date will be removed by TK and the costs thereof will be for the Tenant's account and will be due and payable upon presentation of a relevant invoice. Further, the Tenant shall be considered as an illegitimate possessor of the Properties and shall be liable for the Rental charged at three (3) times the minimum Rental, for every month that such sites, equipment or other Tenant's property remain at the Properties.

8.5 The Parties hereby agree that this Lease contains an agreement between TK and the Tenant that should any statutory rights in relation to security of tenure and the like apply to the Lease, they shall be excluded in relation to the tenancy created by this Lease. [The Parties confirm that TK has served a notice on the Tenant, as required by the Applicable Law, and which applies to the tenancy created by this Lease not less than [14 days] before the Effective Date.][14]

8.6 The Tenant acknowledges that this Lease shall be terminated immediately upon notice to the Tenant if the Concession Agreement expires or is terminated, unless the Parties agree otherwise in writing. The Tenant further waives its statutory rights in connection with its right to occupy the Properties at the end of the termination period contained in the Lease.

PART E – MISCELLANEOUS MATTERS

9 No warranties for use or condition

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[14] ***DWF comment***: *While we've tried to have in place such a contractual right (to exclude a tenant's potential right to security of tenure), please note that the provision might not be enforceable were the Tenant to challenge its validity given that the laws as drafted are likely to end up providing certain protection to the Tenant. We have also included an express acknowledgement and a respective waiver by the Tenant in Clause 8.6 below, which may help.*

9.1 TK gives no warranty that the Properties possess all the necessary consents for the Permitted Use.[15]

9.2 TK gives no warranty that the Properties are physically fit for the purposes specified in Clause 2 (*Property Use*) of this Lease.[16]

9.3 The Tenant acknowledges that it does not rely on, and shall have no remedies in respect of, any representation or warranty (whether made innocently or negligently) that may have been made by or on behalf of TK before the date of this Lease as to any of the matters mentioned in Clause 9.1 or Clause 9.2 above.

10. Limitation of TK's liability

10.1 Subject to Clause 10.2 below, TK is not liable for:

(a) the death of, or injury to the Tenant, its employees, customers or invitees to the Properties; or

(b) damage to any property of the Tenant or that of the Tenant's employees, customers or other invitees to the Properties; or

(c) any losses, claims, demands, actions, proceedings, damages, costs or expenses or other liability incurred by Tenant or the Tenant's employees, customers or other invitees to the Properties in the exercise or purported exercise of the rights granted by Clause 2 (*Property Use*) of this Lease.

10.2 Nothing in Clause 10.1 above shall limit or exclude TK's liability for:

(a) death or personal injury or damage to property caused by gross negligence on the part of TK; or

(b) any matter in respect of which it would be unlawful for TK to exclude or restrict liability.

11. Disputes

11.1 For the purposes of this Clause 11, the term “dispute” shall be interpreted in its widest sense and shall include any dispute or difference in connection with or in respect of the conclusion or existence of this Lease, the carrying into effect of this Lease, the interpretation or application of the provisions of this Lease, the Parties’ respective rights and obligations in accordance with and arising out of this Lease or the validity, enforceability, rectification, termination or cancellation, whether in whole or in part, of this Lease.

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[15] ***DWF comment**: Please note that this is a standard provision that you might see in various common law contracts. And while the language can be retained as is, TK’s failure to warrant any necessary permits in connection with use and suitability of the Properties may be seen as contrary to market customs/practice and this factor is likely to influence any decision on the enforcement of these provisions. An example would be where the Tenant attempts to terminate the agreement on the grounds of unsuitability for purpose or hindrance in the use of the Properties.*

[16] ***DWF comment**: As above.*

11.2 Save as otherwise provided for in this Lease, any dispute between the Parties arising in connection with this Lease shall be resolved in accordance with the provisions of clause 25 (*Dispute Resolution*) of the Concession Agreement.

12. Addresses and notices

12.1 All notices under this Lease shall be made by the Parties in accordance with clause 23 (*Communications*) of the Concession Agreement.

13. Change in Law

13.1 The Tenant acknowledges and agrees that it shall take full risk and responsibility for a Change in Law occurring. Notwithstanding the foregoing, if a Change in Law occurs or is imminent that affects the rights and obligations of the Tenant under this Lease, the Tenant shall notify TK within fourteen (14) days of the date of such Change in Law occurring or (if earlier) coming to the attention of the Tenant, and the Parties shall discuss the effects of the Change in Law and endeavour to arrive at a resolution.

13.2 Any resolution reached between the Parties shall be recorded in writing and such record shall be signed by both Parties.

14. Remedies

14.1 No remedy conferred by this Lease is intended to be exclusive of any other remedy which is otherwise available at law, by statute or otherwise. Each remedy shall be cumulative and in addition to every other remedy given hereunder or now or hereafter existing at law, by statute or otherwise. The election of any one or more remedy by any of the Parties shall not constitute a waiver by such Party of the right to pursue any other remedy.

15. Confidentiality

15.1 Each Party shall at all times keep in confidence the Confidential Information of the other Party which it may acquire for the purposes of or in connection with this Lease (whether prior to or after the Commencement Date) and shall not use or permit the use of such Confidential Information and shall procure that its employees shall not use the Confidential Information, for any other purpose and shall not disclose such Confidential Information to any third party.

15.2 Notwithstanding Clause 15.1 above, a Party may disclose the Confidential Information of the other Party to such former Party's employees or authorised representatives to the extent that such employees or authorised representatives need to know the Confidential Information and shall ensure that such employees or authorised representatives are aware of and comply with, the confidentiality obligations contained in this Clause 15.

15.3 Each Party shall take all such steps as may be reasonably necessary to prevent the Confidential Information of the other Party from falling into the hands of an unauthorised third party.

15.4 The Tenant shall not make any comments to the media relating to this Lease and any related matter nor shall it respond to any queries from the media without the prior written approval of TK.

16. Severance

16.1 In the event that any provision of the Lease is held by any judicial or other competent authority to be illegal, invalid or unenforceable that provision shall be severed to the extent necessary to make the Lease enforceable, and it shall not affect or impair the validity, legality or enforceability of any of the other provisions of the Lease.

17. No agency

17.1 No provision of this Lease shall be construed as constituting an agency, partnership, or joint venture between the Parties and neither Party shall have any express or implied intention to bind the other Party in any way or to represent the other Party unless specifically provided to the contrary in this Lease.

17.2 The Tenant is an independent contractor performing this Lease. The Tenant is not an employee or agent of TK.

18. Corruption and Fraud

18.1 The Tenant warrants that in entering into the Lease it has not committed any Prohibited Act.

18.2 In the event that the Tenant is contacted by a Public Official requesting or suggesting that the Tenant act in a manner which would constitute a Prohibited Act, the Tenant shall immediately provide TK in writing with full details of the request (including the identity of the Public Official making the request).

18.3 Without prejudice to Clause 18.2 above, the Tenant shall ensure that its staff undertaking activities in connection with the Lease are subject to similar obligations to those set out in this Clause 18 and the Tenant shall enforce such obligations.

18.4 In the event that the Tenant fails to comply with the requirements of this Clause 18, TK shall be entitled to terminate the Lease pursuant to Clause 8 (*Breach and Termination*) of the Lease.

19. Entire Agreement

19.1 This Lease constitutes the entire agreement between the Parties in relation to all matters contained herein, including all understandings, rights, responsibilities, duties and obligations and supersedes all prior arrangements, representations, communications, negotiations, agreements and contracts (whether written or oral) made between or entered into by the Parties with respect thereto prior to the Effective Date. None of the Parties shall have any claim or right of action arising from any undertaking, representation or warranty not included in this Lease.

20. No stipulation for the benefit of a third person

20.1 Save as is expressly provided for in this Lease, no provision of this Lease constitutes a stipulation for the benefit of a third person which, if accepted by the person, would bind any Party in favour of that person.

21. No representations

21.1 A Party may not rely on any representation which allegedly induced that Party to enter into this Lease, unless the representation is provided in this Lease.

22. Amendment

22.1 Except as set out elsewhere in this Lease, no modification, amendment, addendum or variation to the Lease shall be effective or binding, unless it (i) is made in writing; and (ii) expressly sets out the modification, amendment, addendum or variation to the Lease; and (iii) refers to the Lease; and (iv) is signed and dated by an authorised representative of each Party.

23. Indulgences

23.1 The grant of any indulgence, extension of time or relaxation of any provision by a Party under this Lease shall not constitute a waiver of any right by the grantor or prevent or adversely affect the exercise by the grantor of any existing or future right of the grantor.

24. General co-operation

24.1 The Parties shall co-operate with each other and shall each execute and deliver to the other Party such other instruments and documents and take such other actions as may be reasonably requested from time to time in order to carry out, evidence and confirm their rights and the intended purpose of this Lease.

25. Governing law

25.1 This Lease is to be governed, interpreted and construed in accordance with the laws of the Islamic Republic of Pakistan.

26. Language

26.1 Unless expressly notified in advance by TK, the primary language of the Lease shall be English. All documents and communications issued between the Parties shall be in English. Unless expressly notified in advance by TK, all minutes of meetings shall be issued in English.

27. Independent advice

27.1 Each of the Parties hereby respectively agrees and acknowledges that: (i) it has been free to secure independent legal advice as to the nature and effect of each provision of this Lease and that it has either taken such independent legal advice or has dispensed with the necessity of doing so; and (ii) each provision of this Lease (and each provision of the Annexes) is fair and reasonable in all the circumstances and is part of the overall intention of the Parties in connection with this Lease.

28. Good faith

28.1 The Parties shall, at all times, act in good faith towards each other and shall not bring the other Party into disrepute.

29. Survival of rights, duties and obligations

29.1 The Surviving Provisions will survive termination or completion of the Lease.

29.2 In the event that the Lease is terminated or completed, neither Party shall be liable to the other Party except: (i) under the Surviving Provisions; or (ii) in respect of any breach of the Lease occurring before such termination or completion; or (iii) any rights or liabilities between the Parties that were pre-existing as at the date of termination or completion.

30. Waiver

30.1 Subject to Clause 30.2 below, no relaxation, forbearance or delay by a Party in enforcing the Lease will prejudice, affect or restrict the rights, responsibilities, obligations, powers or remedies of that Party nor shall any waiver by either Party of any such rights, responsibilities, obligations, powers or remedies, or of any breach of the Lease, be deemed to be a waiver of any other right, responsibility, obligation, power or remedy, or of any later or continuing breach of, the Lease.

30.2 Any waiver of a Party's rights, responsibilities, obligations, power or remedies arising out of, under or in connection with the Lease shall be in writing, dated and signed by the representative of the Party granting such waiver, and shall specify the right, responsibility, obligation, power or remedy and the extent to which it is being waived. No waiver of a breach of a term of the Lease operates as a waiver of any other breach of that term, or of a breach of any other term, of the Lease.

31. Costs

31.1 Any costs, including all legal costs on an attorney and own client basis and taxes, incurred by a Party arising out of or in connection with a breach by another Party shall be borne by the Party in breach.

32. Assignment

32.1 The Tenant shall not cede, assign, delegate, novate, sublet, charge or transfer any of its rights or obligations under the Lease, or any part of it, or any benefit or interest therein, to any person without the prior written consent of TK.

32.2 Notwithstanding anything to the contrary stated in this Lease, TK shall be entitled, without requiring the consent of the Tenant, to cede, assign, delegate, novate or transfer any rights and/or obligations under this Lease to any third party.

33. References, Registration and Attestation

33.1 On execution of this Lease, if required by any Regulatory Body, TK shall (i) register and (ii) attest this Lease with the appropriate Regulatory Body as well as (iii) provide all necessary information and attested documents to the relevant Regulatory Body. The Tenant shall provide reasonable assistance to enable such registration, attestation and other actions.

33.2 If under the Applicable Law, TK is required to obtain references of known persons, who can verify the credentials of the Tenant along with complete particulars of the references, their national identity cards, contact numbers, etc., they shall be described in Annex D (*References*) hereto.

This Lease has been executed on the date stated at the beginning of this Lease.

[*Insert Execution Blocks*]

ANNEX A

DEFINITIONS AND INTERPRETATION

1. Definitions

1.1 In the Lease, the following words and expressions shall have the meanings set out below:

1.1.1 "**Annexes**" means the annexes attached to this Lease;

1.1.2 "**Applicable Law**" means any constitution, statute, ordinance, treaty, decree, proclamation or subordinated legislation or other legislative measure, as amended from time to time, including all national and provincial statutes and legislation and all municipal by-laws, as well as the common law and customary law and any judgment, decision, order or rule of any court or tribunal with relevant jurisdiction and any decision made by judicial or administrative bodies in accordance with any of the aforegoing;

1.1.3 "**Business Day**" means any day other than a Saturday, Sunday or public holiday in the Islamic Republic of Pakistan;

1.1.4 "**Change in Law**" means: (a) the adoption of a new law; or (b) a change in or repeal of an existing law, which after the Effective Date results in: (i) a change in the taxes, duties or levies payable by the Tenant in respect of the use of the Properties; or (ii) a change in or the repeal of any other requirement for the performance of the obligations under this Lease;

1.1.5 "**Commencement Date**" means the date indicated as the Commencement Date in the service notice given to the Tenant by TK in accordance with clause 4.1 of the Concession Agreement;

1.1.6 "**Confidential Information**" means all information, without limitation, of whatsoever nature:

(a) relating to the Disclosing Party's business, operations, processes, drawings, sketches, plans, models, product information, know-how, market opportunities, customers and business affairs;

(b) relating to the relationship of the Disclosing Party with its customers and suppliers; or

(c) relating to the contents of this Lease and any other information received pursuant to this Lease,

but excludes information which:

(i) is required to be disclosed under any law or regulation, or by any Regulatory Body, including any stock exchange on which a Receiving Party may be listed, provided that the Receiving Party in question shall first consult with the Disclosing Party before making any such disclosure, statement or announcement; or

(ii) is in the public domain or enters into the public domain in any way, provided that the entry of such information into the public domain did not entail a breach of this Lease by the Receiving Party; or

(iii) the Receiving Party can show it was within its possession or knowledge, such information being in its use or having been recorded in its files, computers or other recording media, prior to receipt thereof from the Disclosing Party and which information was not previously acquired by the Receiving Party under any obligations of confidence or unlawfully; or

(iv) is disclosed by the Receiving Party with the prior written approval of the Disclosing Party; or

(v) was disclosed by the Disclosing Party to a third party without restriction on disclosure or use, including without limitation, by way of a patent specification; or

(vi) is hereafter disclosed or made available in good faith to the Receiving Party from a source other than the Disclosing Party, without breach by the Receiving Party of any obligation of confidentiality or non-use owed to the Disclosing Party or without breach by such other source who, to the knowledge of the Disclosing Party, is not subject to an obligation of confidentiality or non-use owed to the Disclosing Party; or

(vi) is developed independently by the Receiving Party without reference to the Confidential Information;

1.1.7 "**Concession Agreement**" means the agreement made on [•] between the Parties, whereby TK grants to the Tenant a[n exclusive] right to operate a concession for commercial activities at certain properties;

1.1.8 "**Consumer Price Index**" means the official measure of inflation in the Islamic Republic of Pakistan as published by the Pakistan Bureau of Statistics;

1.1.9 "**Disclosing Party**" means the Party disclosing Confidential Information to the Receiving Party;

1.1.10 "**Effective Date**" means when this Lease has been signed by each Party, the latest of the dates upon which this Lease was signed by any Party;

1.1.11 "**Initial Term**" has the meaning given to it in Clause 2.2.1 of this Lease;

1.1.12 "**Lease**" means this Lease as amended from time to time, including the Annexes;

1.1.13 "**Party**" means a party to this Lease;

1.1.14 "**Permitted Use**" means the use of the Properties solely for the purposes of exercising the concession right granted to the Tenant by the Concession Agreement.

1.1.15 "**Prohibited Act**" means:

(a) offering, giving or agreeing to give to a Public Official a gift or consideration of any kind as an inducement or reward for:

(i) doing or not doing (or for having done or not having done) any act; or

(ii) showing or not showing (or for having shown or not shown) favour or disfavour to any person,

in relation to the award or performance of the Lease or any other agreement with TK; or

(b) entering into an agreement for which commission has been paid or has been agreed to be paid by the Tenant or on its behalf, or to its knowledge, unless before the relevant agreement is entered into, particulars of any such commission and of the terms of any such agreement for the payment thereof have been disclosed in writing to TK; or

(c) committing any offence under the Applicable Law creating offences in respect of fraudulent acts; or

(d) defrauding, attempting to defraud or conspiring to defraud TK;

1.1.16 “**Properties**” means certain properties owned and operated by TK in respect of which the Tenant has been granted leasehold rights, as further described in Annex B (*Properties*) of this Lease;

1.1.17 “**Public Official**” means an official or employee of a government owned or controlled enterprise or any Regulatory Body and shall include any individual defined as a public official in the Applicable Law;

1.1.18 “**Receiving Party**” means the Party receiving Confidential Information from the Disclosing Party;

1.1.19 “**Regulatory Body**” means any governmental, semi-governmental, administrative, fiscal or judicial ministry, department, commission, authority, tribunal, agency, police, notary public or municipality, and shall include the provider of electricity, gas, water, wastewater, telecoms and other such public services, and any body with a regulatory function under the Applicable Law;

1.1.20 "**Rent Deposit**" means a percentage of the Rental payable by the Tenant as set out in Annex C (*Rent Deposit and Rent Deposit Account*) of the Lease.

1.1.21 "**Rent Deposit Account**" means a bank account where the Rent Deposit is to be paid as set out in Annex C (*Rent Deposit and Rent Deposit Account*) of the Lease.

1.1.22 "**Rental**" means the minimum guaranteed monthly rental payable by the Tenant to TK recorded in the transaction addenda to the Concession Agreement.

1.1.23 “**Surviving Provisions**” means Clause 1 (*Preliminary Matters*); Clause 8 (*Breach and Termination*); Clauses 9-33 (*Part E – Miscellaneous Matters*) and this Annex A;

1.1.24 "**Tenan**t" has the meaning given to it in Recital 2;

1.1.25 "**TK**" has the meaning given to it in Recital 1.

1.1.26 **"Utilities**" mean water, sewerage, electricity and telephone and such other supplies as are available for the benefit of the Properties for the Permitted Use form time to time.

2. Interpretation

2.1 In the Lease:

2.1.1 in the event of conflict between the Annexes and the provisions of the Lease (excluding the Annexes), the provisions of the Lease shall prevail;

2.1.2 any definition in this Lease, shall bear the same meaning and apply throughout this Lease including Annexes hereto, unless otherwise stated or inconsistent with the context in which it appears;

2.1.3 the singular includes the plural and vice versa;

2.1.4 a reference to a statutory provision includes any subordinate legislation made from time to time under that provision and includes those provisions as amended, consolidated, re-enacted or replaced from time to time;

2.1.5 a reference to a document includes the document as modified from time to time and any document replacing it, in each case in the manner permitted by the Lease;

2.1.6 a reference to a gender includes the other genders;

2.1.7 a reference to any government agency or body, if that agency or body ceases to exist or is reconstituted, renamed or replaced or has its powers or functions removed (“defunct body”), means the agency or body that performs most closely the functions of the defunct body;

2.1.8 a reference to an “agent” shall mean any person with a contractual relationship with a Party and carrying out activities or obligations on behalf of that Party;

2.1.9 references in this Lease to “Clauses” or to “Annexes”, are to clauses of and Annexes to this Lease;

2.1.10 references to notices or requests made or received by any of the Parties shall, unless expressly provided otherwise in this Lease, refer to notices or requests in writing;

2.1.11 references to “agree” or “agreed” shall require the agreement to be recorded in writing and signed by the authorised representatives of the Parties;

2.1.12 no rule of construction shall be applied to the disadvantage of a Party to this Lease because that Party was responsible for or participated in the preparation of this Lease or any part of it;

2.1.13 unless otherwise provided, any number of days prescribed shall be determined by excluding the first and including the last day or, where the last day falls on a day that is not a Business Day, the next succeeding Business Day;

2.1.14 references to day/s, month/s or year/s shall be construed as Gregorian calendar day/s, month/s or year/s, as the case may be;

2.1.15 if a definition imposes substantive rights and obligations on a Party, such rights and obligations shall be given effect to and shall be enforceable, notwithstanding that they are contained in a definition;

2.1.16 the use of the word “including” followed by a specific example/s shall not be construed as limiting the meaning of the general wording preceding it and it shall be construed as if it were followed by “without being limited to”.

ANNEX B

PROPERTIES

[*Insert the description of the relevant Properties, including the registration numbers, addresses and maps/plans, if applicable*]

ANNEX C
RENT DEPOSIT AND RENT DEPOSIT ACCOUNT

[*Insert the details of the Rent Deposit (the relevant percentage of the Rental) and the Rent Deposit Account*]

ANNEX D
REFERENCES

[*If under the Applicable Law the landlord is required to obtain references of known persons, who can verify the credentials of the tenant along with complete particulars of the references, their National Identity Cards and contact numbers, they should be referenced in the lease agreement. Please provide the relevant information about the references in this Annex D, if required.*]

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 2.5 - DRAFT CONTRACTS

OPERATOR CONTRACTS – ANNEX A & AGREEMENT

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

BRT VEHICLE OPERATOR AGREEMENT

between

[TransKarachi]

and

[*BRT Company*]

Date: [•] 2019

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THIS BRT VEHICLE OPERATOR AGREEMENT (the “**Agreement**”) is made on [••••••••••] 2019

BETWEEN

1. **[TRANSKARACHI**, a statutory body established under Section 42 of the Companies Act of 2017 with its office located at [•], Karachi, Pakistan (hereinafter referred to as “**TransKarachi**” which expression shall include its successors-in-interest and permitted assigns)]; and

2. <***Insert name of the BRT Company***>, a company incorporated in [•••••••••••••], with company registration no. [•••••••••] and whose registered address is at [•••••••••••] (the “**Operator**”).

TransKarachi and the Operator are individually referred to herein as a “**Party**” and collectively as the “**Parties**”.

WHEREAS:

A. [TransKarachi is a statutory body established by the Government of Sindh, Pakistan, and responsible for design, development, coordination, operation, maintenance and regulation of mass transit systems in the Province of Sindh, including the Karachi Bus Rapid Transit (BRT) Red Line Project (the "**Project**").]

B. TransKarachi intends to enter into long-term agreements with suitable operator(s) (selected through a competitive bidding process) who will provide operation and maintenance of the Vehicles as part of the Project.

C. The Operator, the vehicle operating company, is a special purpose company which has been set up for the purposes of entering into and performing this Agreement.

D. TransKarachi wishes to appoint the Operator on a non-exclusive basis to provide the Services, and the Operator wishes to accept such appointment and carry out the Services in accordance with the terms and conditions of this Agreement.

NOW THE AGREEMENT PROVIDES:

PART A - GENERAL

1. Preliminary Matters

1.1 Definitions and Interpretation

1.1.1 The defined words and expressions set out in Clause 1 of Annex A (*Definitions and Interpretation*) hereof and the provisions relating to the construction and interpretation of the Agreement set out in Clause 2 of Annex A (*Definitions and Interpretation*) hereof shall apply to the Agreement.

1.1.2 In the event of any inconsistency between the provisions of the body of this Agreement and the Annexes, or between any of the Annexes, the conflict shall be resolved according to the following descending order of priority:

(a) the body of this Agreement, including Annex A (*Definitions and Interpretation*);

(b) Annex B (Operational Specifications Schedule);

(c) Annex C (Payment Calculation Schedule); and

(d) Annex D (Property Use Agreement), Annex E (Lease-to-Own Agreement), Annex F (Performance Guarantee), and Annex G (Parent Company Guarantee); and

(e) Annex H (EOP List to be provided after signing of the Agreement).

1.2 Effect of this Agreement

1.2.1 The Parties hereby agree that this Agreement shall immediately be binding on them as of the Effective Date.

1.3 Conditions Precedent

1.3.1 TransKarachi shall issue a Service Notice indicating the date upon which all the Conditions Precedent have been fully satisfied (and/or waived as applicable) and otherwise when the Services are to commence.

1.3.2 The Conditions Precedent that are required to be satisfied (and/or waived as applicable) are as follows:

(a) the Parties initial the form of the Lease-to-Own Agreement as agreed; and

(b) the Property Use Agreement is executed by the Parties; and

(c) the Operator has provided to TransKarachi the Performance Guarantee in accordance with Clause 3 (*Performance Guarantee*); and

(d) the Operator has provided to TransKarachi the Parent Company Guarantee in accordance with Clause 4 (*Parent Company Guarantee*).

1.3.3 The Parties shall use their best endeavours to procure the fulfilment of each of the Conditions Precedent.

1.3.4 The Parties shall be entitled, by written agreement, to waive any of the Conditions Precedent (only to the extent that a Condition Precedent is capable of waiver under the Applicable Law).

1.3.5 If a Condition Precedent remains unfulfilled (and is not waived) for an unreasonably long time (in the opinion of TransKarachi), then, save and except the Surviving Provisions, TransKarachi shall be entitled to consider this Agreement null and void *ab initio* and TransKarachi shall be discharged from any and all liability that may have arisen or that may arise under this Agreement.

2. Appointment of Operator

2.1 Appointment

2.1.1 TransKarachi's signing this Agreement shall indicate its appointment of the Operator to provide the Services. Such appointment shall only be effective as of the Effective Date.

2.1.2 The Operator hereby accepts the appointment by TransKarachi and agrees to provide the Services in accordance with the terms and conditions of this Agreement.

2.2 Commencement of the Services and Term

2.2.1 The Operator shall provide the Services from the Commencement Date until the Termination Date.

2.2.2 Unless this Agreement is earlier terminated, the Operator shall continuously provide the Services contemplated under this Agreement (as may be amended pursuant to its terms) for a term of [twelve (12) years] commencing from the Commencement Date.

3. Performance Guarantee

3.1 The Operator shall ensure that it maintains with TransKarachi a valid and enforceable Performance Guarantee until the Operator has fulfilled all its obligations under the Agreement. The Operator shall have delivered to TransKarachi as a Condition Precedent the duly executed Performance Guarantee in the form attached hereto as Annex F (*Performance Guarantee*) and in the amount of PKR [500,000,000 (five hundred million).] The Performance Guarantee shall have a term of three (3) years and shall be renewed or replaced no later than sixty (60) days before its expiry. Such renewed or replacement Performance Guarantee shall be delivered to TransKarachi no later than forty-five (45) days prior to the expiry of the existing Performance Guarantee. TransKarachi shall return the previously provided Performance Guarantee to the Operator within thirty (30) days of the receipt of the replacement of Performance Guarantee.

3.2 Subsequent to the delivery of the initial Performance Guarantee, the Operator shall thereafter ensure that the amount of the renewed or replacement Performance Guarantee is the greater of PKR [500,000,000 (five hundred million)] and the two (2)-year monthly average of payments due to the Operator multiplied by three (3). For purposes of this Clause, the two (2) years to be used in determining the two (2)-year monthly average shall be the twenty-four-month period immediately preceding the month before the month in which the determination is being made.

3.3 The Performance Guarantee shall be issued by a local bank with a minimum net asset value of PKR [100,000,000,000 (one hundred billion)] as approved by TransKarachi.

3.4 If the Operator fails to provide TransKarachi with a replacement Performance Guarantee as required under this Agreement, TransKarachi may (without prejudice to its other remedies) immediately liquidate all or part of the Performance Guarantee.

3.5 If the Performance Guarantee is partially liquidated, the Operator is obliged to replenish the Performance Guarantee in full within seven (7) days of the date of any liquidation thereof. If the Operator fails to replenish the Performance Guarantee in accordance with this Clause, this shall constitute a material breach of this Agreement and TransKarachi shall be entitled to liquidate the remainder of the Performance Guarantee and terminate this Agreement pursuant to Clause 38 (*Breach and Termination*).

3.6 Subject to the fulfilment by the Operator of all of its obligations under this Agreement, the Performance Guarantee shall be released by TransKarachi within thirty (30) days after the Termination Date.

3.7 All fees, taxes and expenses associated with preparing, providing, issuing, extending, replacing, replenishing or stamping (if applicable) of the Performance Guarantee shall be borne by the Operator.

4. Parent Company Guarantee

4.1 In the event that the Operator is a branch, subsidiary, affiliate or otherwise of a Parent Company, then the Operator shall, at its own expense, procure a Parent Company Guarantee for the benefit of TransKarachi from its Parent Company.

4.2 In the event that the Operator is a joint venture, partnership, consortium or other association of two or more entities or persons and any member of the Operator is a branch, subsidiary, affiliate or otherwise of a Parent Company, then each such member shall, at its own expense, procure a Parent Company Guarantee for the benefit of TransKarachi from its Parent Company.

5. Payment for Services

5.1 Payment to the Operator for the provision of the Services shall be made in accordance with the Payment Calculation Schedule.

5.2 TransKarachi shall be entitled to set off against any amounts payable to the Operator, any amount which may be due by the Operator to TransKarachi.

5.3 Any payment to the Operator shall not constitute a waiver of any right held by TransKarachi in respect of a breach of this Agreement by the Operator.

6. Tax

6.1 To the extent that the Services or any additional activities and/or services offered by the Operator pursuant to this Agreement are taxable, the Operator agrees to bear all Applicable taxes, charges, duties and/or tariffs by itself (Except Sales Tax on Services) and, upon request from TransKarachi, provide proof that such obligations have been satisfied in full.

6.2 In respect of tax-exempt Services, if any, the Operator shall at all times be in possession of a valid tax clearance certificate and shall provide the same to TransKarachi on an annual basis and to the extent that the Operator is not in possession of a valid tax clearance certificate, it shall immediately provide TransKarachi with satisfactory proof of its application for such tax clearance certificate.

6.3 TransKarachi may cease all payments to the Operator in respect of any period during which the Operator is not in compliance with the provisions of Clauses 6.1 and 6.2 above. Upon such compliance by the Operator, TransKarachi shall effect payment of all amounts that had been withheld pursuant to this Clause 6.

PART B - THE VEHICLES

7. The Vehicles

7.1 The Fleet

7.1.1 TransKarachi shall procure the Fleet, including the Initial Fleet, at its own cost.

7.1.2 TransKarachi shall not be entitled to schedule more than [ninety-five percent (95%)] of all allocated Vehicles to be put into service at any time. The remaining [five percent (5%)] shall constitute the notional reserve fleet for the purposes of scheduled maintenance, repair, Driver training and immediate replacement for any Vehicles out of service so as to ensure the seamless and continued provision of the Services in accordance with this Agreement.

7.1.3 The Initial Fleet shall be delivered to the Operator at the Depot no later than fourteen (14) days prior to the Commencement Date or at such other time and place agreed between the Parties.

7.1.4 For the duration of this Agreement, unless agreed otherwise in writing by the Parties, the Operator shall use the Vehicles solely for the provision of the Services in accordance with this Agreement.

7.1.5 Legal title to and ownership of the delivered Vehicles (including all associated tools and equipment) shall remain with TransKarachi until such time as the legal title and ownership is transferred to the Operator pursuant to the terms of the Lease-to-Own Agreement. The Operator shall be a lessee of the Vehicles and shall have the rights and obligations of a lessee to possess and use the Vehicles solely for the purposes expressly provided for in this Agreement and/or agreed in writing between the Parties.

7.1.6 TransKarachi agrees to do all things necessary and execute all documents to effect the legal transfer of title, interest and ownership of the Vehicles to the Operator pursuant to the terms of the Lease-To-Own Agreement.

7.1.7 The Operator shall not create or allow the creation of any Encumbrance in any manner of any or all of the Vehicles without the prior written consent of TransKarachi.

7.2 Additional and Replacement Vehicles

7.2.1 If, in consultation with the Operator, TransKarachi deems it necessary to increase the Fleet in order to respond to an increased demand or an anticipated increase in demand for the Services or economic reasons or for operational reasons or for any other reasons, TransKarachi may procure the Additional Vehicles. TransKarachi reserves the right to increase the quantity by [twenty-five percent (25 %)] of the fleet of the existing Agreement.

7.2.2 At the time of providing Additional Vehicles to the Operator the TransKarachi shall in its sole discretion, determine whether it is in its interest to execute a Lease-To-Own Agreement in connection with such Additional Vehicle(s). If it determines that it is not in its interest to execute a Lease-to-Own Agreement in connection with such Additional Vehicle(s), then it shall retain full legal title and/or ownership of such Additional Vehicle(s).

7.2.3 The Operator shall be obliged, during the term of this Agreement, to immediately notify TransKarachi in writing of any Vehicle which has travelled more than [1.2 million kilometres] and shall specifically state in that notification whether or not it deems a Replacement Vehicle necessary. TransKarachi shall make an independent determination of whether it believes such Vehicle is suitable to continue in operation. If, in its sole discretion, TransKarachi determines that a Replacement Vehicle is required, then such Replacement Vehicle shall be procured by TransKarachi and provided to the Operator.

7.2.4 Notwithstanding anything contained in Clauses 7.2.1 and 7.2.2 above, TransKarachi reserves the right to increase the quantity of buses by [hundred percent (100 %)] of the fleet of the existing contract on the prevalent terms and conditions of the Agreement in the first one year.

8. Delivery, Care and Ownership of the Vehicles

8.1 TransKarachi shall deliver or procure the delivery of the Vehicles allocated to the Operator on the relevant Vehicle Delivery Date(s) (tentatively) and the Operator shall be obliged to accept such delivery in accordance with this Agreement.

8.2 At the time of delivery of the Vehicles, the Operator and TransKarachi shall jointly carry out an inspection of the Vehicles delivered to the Operator. The state and condition of each Vehicle shall be recorded in writing and that writing signed by the Operator and TransKarachi.

8.3 The Vehicles shall be properly maintained by the Operator in accordance with the manufacturer’s standards and/or requirements.

8.4 TransKarachi shall be entitled to conduct unscheduled inspections of each Vehicle to ensure that it continues to be in compliance with the Operational Specifications Schedule and in satisfactory operational condition (fair wear and tear excluded). If any Vehicle is found not to be in compliance with the Operational Specifications Schedule or in unsatisfactory condition, TransKarachi shall immediately inform the Operator and the Operator shall, within a reasonable time or a time determined by TransKarachi, effect the required repairs/replacement at its own cost.

8.5 If a Vehicle requires repair/replacement and is not so repaired/replaced by the Operator within a reasonable time or the time determined by TransKarachi, TransKarachi shall be entitled to either liquidate a part or all of the Performance Guarantee for purposes of effecting such repairs/replacement and/or access the Reserve Fund for purposes of effecting such repairs/replacement. Any usage of the Reserve Fund by TransKarachi shall obligate the Operator to replenish the Reserve Fund to the required and/or agreed levels.

PART C - OPERATOR RESPONSIBILITIES

9. General Obligations – Vehicles and Operations

9.1 The Operator shall operate the Vehicles in accordance with this Agreement (including the Operational Specifications Schedule) and the Applicable Law.

9.2 The Operator shall ensure that the Vehicles at all times are in compliance with the Operational Specifications Schedule, the requirements of any applicable specifications and the Applicable Law.

9.3 The Operator shall maintain detailed vehicle maintenance and repair records for the duration of this Agreement. TransKarachi shall be entitled to audit such records upon giving the Operator no less than twenty-four (24) hours' notice. The Operator shall also provide these records (or any portions thereof) as may be reasonably requested by TransKarachi.

9.4 Unless expressly specified in this Agreement, the Operator shall solely be responsible for all costs and/or expenses associated with the fit-out, furnishing, administration, office space and/or any and all operational costs associated with its operations until the Termination Date.

10. Operations of the Vehicle Operating Company

10.1 VOC Dispatch Schedule and Headway Targets, Vehicle Dispatch Plans and Service Delivery Plans

10.1.1 TransKarachi (either directly or through the System Control Service Provider) shall, no later than fourteen (14) days prior to the Commencement Date, provide to the Operator the initial VOC Dispatch Schedule and Headway Targets. TransKarachi (either directly or through the System Control Service Provider) shall thereafter on a monthly basis provide the VOC Dispatch Schedule and Headway Targets to the Operator. The relevant VOC Dispatch Schedule and Headway Targets shall be provided to the Operator no later than seven (7) days prior to the end of the calendar month for which it is intended to be implemented.

10.1.2 The Operator shall within three (3) days of receipt of the VOC Dispatch Schedule and Headway Targets, submit for TransKarachi's approval a Vehicle Dispatch Plan. TransKarachi shall, within three (3) days of its receipt of the Vehicle Dispatch Plan, approve or reject (with or without comments) such submitted Vehicle Dispatch Plan.

10.1.3 The Operator shall not be entitled to modify an approved Vehicle Dispatch Plan unless it receives TransKarachi's prior written approval.

10.1.4 Within seven (7) days of the Commencement Date (unless otherwise agreed by TransKarachi), the Operator shall prepare and submit for TransKarachi's approval the Service Delivery Plan. Such Service Delivery Plan shall, at a minimum, detail the Operator's plans for rendering the Services in accordance with the Operational Specifications Schedule.

10.1.5 TransKarachi shall be entitled to request periodic revisions to the Service Delivery Plan so that it accurately reflects the requirements for effectively performing the Services. The Operator shall make such revisions (within the time specified by TransKarachi) and submit such revisions for TransKarachi's approval. The Operator shall not be entitled to modify an approved Service Delivery Plan unless it receives TransKarachi's prior written approval to do so.

10.1.6 The Operator shall provide the Services strictly in accordance with the Operational Specifications Schedule, the approved Service Delivery Plan and any further instructions of TransKarachi given pursuant to this Agreement.

10.1.7 Notwithstanding the Operator's obligations regarding servicing and maintenance of Vehicles, the Operator shall be entitled to apply to TransKarachi in writing for a variation in the types of Vehicles which are to be used to provide the Services on the basis of a change in passenger demand or the utilisation of better suited Vehicles with a different capacity than the Capacity, having regard to Vehicles then at the Operator's disposal. TransKarachi shall, in its sole discretion, be entitled to grant or refuse such request having regard to, among other things, the financial implications thereof. TransKarachi's decision shall be communicated to the Operator within fourteen (14) days of the Operator's written request being received by TransKarachi and shall be final and binding on the Operator.

10.1.8 The Operator may not refuse to convey a person on a Trip (excluding a Trip in relation to Scheduled Positioning Kilometres) or part thereof unless:

(a) the passenger Capacity will be exceeded at the time in question; or

(b) such person is or becomes violent, offensive, abusive, engages in illegal conduct or represents a threat to other occupants of the Vehicle; or

(c) such person refuses to pay the fare or presents an invalidated ticket.

Where such an incident occurs, the Operator shall be obliged to log a report with TransKarachi within fifteen (15) minutes of the occurrence (or as soon as practicable thereafter), detailing the nature and location of the incident and where applicable, details of the parties involved.

10.2 Minimum Kilometre Entitlement and Kilometre Variations

10.2.1 From the Commencement Date and for the duration of the Agreement, the Operator shall be entitled to operate the Fleet for the Minimum Annual Kilometre Distance.

10.2.2 Should the Operator for any reason (not attributable to itself) be prevented from operating a Vehicle for the Minimum Annual Kilometre Distance, then TransKarachi shall pay the Operator hundred percent (100%) of the Kilometre Charge for the difference in distance actually operated and the Minimum Annual Kilometre Distance. The Parties agree that this Clause shall not apply to an Event of Force Majeure as contemplated by Clause 36.3.

10.2.3 For purposes of calculating the Minimum Annual Kilometre Distance, TransKarachi shall include Scheduled Kilometres and distances operated in relation to Event Services and Charter Services.

10.2.4 TransKarachi shall not be entitled to increase or decrease the number of kilometres to be operated by the Operator by more than thirty percent (30%) without giving the Operator at least two (2) Months' notice.

10.3 Temporary interruptions, delays or deviation from scheduled Trips

10.3.1 The cancellation of Trips by the Operator shall only be permitted if such cancellation is due to:

(a) unforeseen road closures, traffic congestions, weather conditions (all subject to prior agreement with TransKarachi), or any Event of Force Majeure; or

(b) immediate danger to life and/or personal injury and/or serious damage to Vehicles or other property,

in which event, TransKarachi and the Operator shall meet in good faith on an urgent basis, to agree upon the deviation from the Trips to be allowed and the expected date and/or time of recommencement of the Trips, or if the Parties fail to reach agreement within one (1) hour after having met for the first time, TransKarachi’s decision shall be final and binding on the Parties.

10.3.2 Where the Operator is of the opinion that Trips should be cancelled due to boycott action, intimidation, violence, strike action or any threats of the aforegoing, either against the Operator or generally, the Operator shall refer the matter to TransKarachi for its decision, which shall be final and binding and not be subject to the provisions of Clause 39 (*Dispute resolution*). Should TransKarachi decide that such cancellation is justified, no Performance Deduction Percentages shall apply. However, should TransKarachi decide that such cancellation is not justified and the Operator nevertheless fails to render the Services for any period of time whilst the action or threats contemplated above continue, then TransKarachi shall be entitled to apply Performance Deduction Percentages in accordance with Clause 33 (*Performance Deduction Percentages*) and the Operational Specifications Schedule and no payment shall be made in respect of such cancelled Trips.

10.3.3 The Operator shall inform TransKarachi immediately of any proposed cancellation of any Trips pursuant to Clause 10.3.1(a) and/or Clause 10.3.1(b) and the Parties shall meet on an urgent basis to agree upon the deviation to be allowed and the recommencement of the Trips, or if they fail to reach agreement within a reasonable time as determined by TransKarachi, TransKarachi's decision shall be final and binding on the Parties and Clause 39 (*Dispute resolution)* shall not apply in relation to TransKarachi's decision.

10.4 Skill and care in rendering uninterrupted Services

10.4.1 The Operator shall exercise the highest degree of skill, care and diligence in the provision of the Services to the reasonable satisfaction of TransKarachi.

10.4.2 Without limiting the generality of the aforegoing, the Operator shall provide the Services at a standard which would reasonably avoid the incurring of Performance Deduction Percentages as contemplated in the Operational Specifications Schedule.

10.4.3 The Operator acknowledges and accepts that it is imperative for the success of the BRT System that the Services are rendered without interruption or delay and undertakes to do all things reasonably necessary to ensure such uninterrupted, prompt and efficient service.

10.5 Compliance with standard operating and control procedures and requirements

10.5.1 The Operator shall at all times comply with any standard operating and control procedures and requirements for the day to day administration, monitoring, control and performance of this Agreement as may be reasonably determined by TransKarachi from time to time and the specific circumstances under which the BRT System operates from time to time, which shall include the Operational Specifications Schedule.

10.6 Gas availability

10.6.1 The Parties acknowledge that the Vehicles constitute "compressed natural gas"(CNG)-electric hybrid vehicles. TransKarachi hereby guarantees the availability of compressed natural gas required for the Vehicles at PKR [13] per kg up to [0.40] kg per bus-km, or other prices and/or quantities as may be notified from time to time by TransKarachi to the Operator.

11. Operating Licenses

11.1 The Operator shall maintain the validity of all Operating Licences for the duration of this Agreement and shall ensure that the terms or conditions of such Operating Licenses are not contravened.

12. Deleted Intentionally

13. Drivers

13.1 The Operator shall hire Drivers with a valid PSV license and who are suitably qualified, and shall ensure that all Drivers for duration of the Services remain suitably qualified and trained and meet the requirements set out in the Operational Specifications Schedule and any Applicable Laws.

13.2 Notwithstanding any Performance Deduction Percentages that may be applied pursuant to this Agreement, in relation hereto, where a Driver operates a Vehicle in contravention of any Applicable Law and/or the requirements of the Operational Specifications Schedule, TransKarachi shall be entitled to demand (and the Operator shall be obliged to promptly comply with such demand) that such Driver is immediately removed from the Vehicle and replaced with another Driver who is suitably qualified.

14. Co-operation with Other Contractors/Other Operators

14.1 Where interaction between the Operator and any Other Contractors/Other Operators is required in accordance with this Agreement, in practice or in accordance with a Service Notice or Protocol, for the efficient and effective operation of the BRT System, the Operator shall co-operate with Other Contractors/Other Operators and shall take such reasonable steps as may be required to formulate the necessary operating procedures and practices by agreement with Other Contractors/ Other Operators, in accordance with the Service Notice or Protocol, as the case may be.

14.2 Should the Operator and Other Contractors fail to reach an agreement as contemplated in Clause 14.1, TransKarachi shall be entitled to issue a Protocol to regulate their interaction or make a final determination in the event of a dispute between them, as the case may be.

14.3 In any event, notwithstanding the provisions above, TransKarachi shall at all times be entitled to issue Protocols regulating the interaction between the Operator and Other Contractors/Other Operators.

14.4 The Operator shall be obliged to follow such Protocols, which, in the event of a conflict, shall supersede any agreement between the Operator and Other Contractors/Other Operators in accordance with Clause 14.1 above.

15. Equipment on Vehicles

15.1 The Operator shall, if required and/or where applicable, take all necessary steps to make the Vehicles available to TransKarachi and its contractors for the purposes of installation, removal or maintenance of any equipment:

15.1.1 within twelve (12) hours of TransKarachi or its contractors requesting such access for purposes of maintenance or servicing;

15.1.2 within twenty-four (24) hours of TransKarachi or its contractors requesting such access for purposes of maintenance or servicing of the Vehicles at a location other than a Depot; and

15.1.3 within one (1) hour in emergency situations (subject to traffic conditions and completion of trip) and where the relevant Vehicle is required for the provision of the Services.

15.2 Where equipment on a Vehicle which Other Contractors are required to maintain and repair malfunctions and results in a Vehicle being removed from the Services, the Operator shall make such Vehicle available to the relevant Contractor immediately for repair of the aforesaid malfunction.

16. Employment

16.1 The Operator shall recruit and employ all Employees necessary to provide the Services, including Drivers, mechanics, washers/cleaners, inspectors and all other administrative and management staff.

16.2 The Operator shall, in recruiting staff, comply with its obligations in accordance with this Agreement, and shall where appropriate, provide any training required (including but not limited to driving, customer service, emergency management and services) to render such persons suitable to provide the Services required under this Agreement.

16.3 The Operator shall, for a period of no less than three (3) years from the Commencement Date, ensure that at least thirty percent (30%) of its Employees shall be employed from the EOP List. The Operator shall screen the potential staff on the EOP List and provide any training required in order to achieve and maintain the thirty percent (30%) threshold.

16.4 Should the percentage of Employees employed from the EOP List at any time fall below the threshold referred to in Clause 16.3 above, TransKarachi shall be entitled to request that the Operator provide TransKarachi with a brief statement setting out:

16.4.1 the reasons for failing to maintain any of these thresholds;

16.4.2 all steps the Operator has taken to meet and maintain these thresholds (including providing applicable training to available but unqualified potential staff); and

16.4.3 any other factors which the Operator considers relevant in assisting TransKarachi to exercise its discretion under Clause 16.5 below.

16.5 After consideration of the Operator's statement and such further information as TransKarachi may request, TransKarachi shall be entitled, in its sole discretion, to waive all or part of any applicable Performance Deduction Percentages under the Operational Specifications Schedule.

16.6 **Gender Action Plan**

16.6.1 The Operator shall ensure that at least twenty percent (20%) of its Employees are female. The Operator shall also develop internal policies to promote working environment for women and persons with disabilities which should be in line with national regulations.

16.6.2 Offices hired/ used by the Operator shall be universally accessible for women, children and persons with disabilities. The Operator shall provide employment opportunities to persons with disabilities in accordance with the relevant laws and provide equal employment opportunities without discrimination on the ground of gender.

16.6.3 Should the percentage of Employees employed from at any time fall below the threshold referred above, TransKarachi shall be entitled to request that the Operator provide TransKarachi with a brief statement setting out:

a) the reasons for failing to maintain any of these thresholds;

b) all steps the Operator has taken to meet and maintain these thresholds (including providing applicable training to available but unqualified potential staff); and

c) any other factors which the Operator considers relevant in assisting TransKarachi to exercise its discretion under Clause 16.6.4 below.

16.6.4 After consideration of the Operator's statement and such further information as TransKarachi may request, TransKarachi shall be entitled, in its sole discretion, to waive all or part of any applicable Performance Deduction Percentages under the KPIs/ Operational Specification Schedule.

17. Uniforms

17.1 The Operator shall ensure that its Employees are appropriately attired in the Uniforms prescribed in the Operational Specifications Schedule (as may be amended from time to time).

17.2 The Operator shall ensure that the Uniforms are clean, kept in good condition and worn in a professional manner at all relevant times in accordance with the high standards required by TransKarachi in relation to the branding of the BRT System.

18. Image and Marketing

18.1 The Operator shall not use any image, brand name, company name or its parent company name, markings, graphics and/or signage of TransKarachi for any purpose except with the written approval of TransKarachi.

18.2 The Operator shall comply with instructions from TransKarachi from time to time regarding branding in terms of the use of graphics, brand name, company name, information, signage, information, advertising and Vehicle livery, and shall co-operate with and participate in agreed marketing programmes as directed by TransKarachi.

18.3 The Operator shall be entitled to, with TransKarachi's prior written approval of the content, affix or display advertising material in agreed designated areas only on the interior of the Vehicles and generate revenues out of such advertising activity in accordance with the Operational Specifications Schedule. For the avoidance of doubt, certain content (for example vulgar or culturally insensitive content or content relating to the advertising of any other mode of transportation) are strictly prohibited and will not be approved by TransKarachi.

19. Access control

19.1 The Operator shall coordinate with the System Control Service Provider to monitor access control and fare evasion on Vehicles. The System Control Service Provider shall be primarily responsible for managing access control and fare evasion on Vehicles.

20. On-board Units

20.1 TransKarachi shall have the right to install, maintain, replace and/or upgrade the On-board Units on the Vehicles during the term of this Agreement.

20.2 The Operator shall:

20.2.1 at all times comply with the reasonable specifications and instructions for the operation, care and use of the On-board Units as prescribed by TransKarachi by notice from time to time;

20.2.2 not allow the On-board Units to be used for any purpose other than to fulfil its obligations in respect of the provision of the Services as set out in this Agreement;

20.2.3 keep detailed record of all defects and repairs effected by TransKarachis contracted suppliers of the On-board Units for inclusion in regular reports to TransKarachi as may be prescribed by TransKarachi from time to time;

20.2.4 bear the cost of repair to or replacement of the On-board Units occasioned by theft or damage or resulting from the abuse or negligence. The Operator shall be entitled to inspect the relevant On-board Unit prior to such repair or replacement;

20.2.5 not permit any Vehicle to leave the Depot for the purpose of performing a Trip with an unrepaired and/or defective On-board Unit, unless the Operator has reported the defect to TransKarachi and TransKarachi has instructed the Operator to utilise the relevant Vehicle on a specific Route;

20.2.6 ensure that all Drivers immediately report any malfunctioning and/or defects in any of the On-board Units detected during any Trip or maximum at end of the Trip, to TransKarachi. Each such report must be made to the Operator by the relevant Driver by no later than the time of the relevant Vehicle's arrival at the next Station or Stop according to the Schedule. The Operator shall immediately report such malfunction and/or defect to TransKarachi and shall subsequently provide a written report of the same to TransKarachi. The Operator and the Driver shall adhere to any instruction given by TransKarachi after reporting a defect;

20.2.7 afford the System Control Service Provider, authorised by TransKarachi, reasonable access to the Vehicles for purposes of maintaining and/or servicing of the On-board Units.

20.3 Risk and ownership of the On-board units

20.3.1 Ownership of the On-board Units shall at all times, unless later agreed otherwise in writing, remain vested in TransKarachi.

20.3.2 The Operator shall not be entitled to remove, sell or otherwise dispose of or encumber in any way whatsoever, the On-board Units or any part thereof during the term of this Agreement.

21. Monitoring of the Services

21.1 TransKarachi shall be entitled to require regular written reports by the Operator in such reasonable form, detail and frequency as may be determined by TransKarachi or to call meetings with the Authorised Representative of the Operator on reasonable notice, for any purposes regarding the performance of the Services and/or the implementation of this Agreement.

21.2 An Authorised Representative of TransKarachi shall at all reasonable times be given access to the Vehicles, the Staging Area, Stops, Employees and any place where the Services (or any portion thereof) are being performed to satisfy itself as to the Operator's compliance with its obligations under this Agreement and for purposes of assessing the Operator's performance against agreed KPIs.

22. Provision of Financial Information

22.1 For the duration of this Agreement, the Operator shall deliver to TransKarachi:

22.1.1 audited annual financial statements of the Operator within ninety (90) days after each relevant Financial Year-end; and

22.1.2 unaudited management accounts of the Operator (comprising a profit and loss account, balance sheet and cash flow statement), copies of which shall be delivered to TransKarachi within thirty (30) days after the end of each Quarter of a Financial Year. Without detracting from TransKarachi's rights under this Agreement, and in order to assist the Operator in taking proactive steps to ensure the sustainability of its operations and identify any negative trends which may likely impact the Services, TransKarachi may provide the Operator with such feedback as it may consider appropriate from time to time arising from its consideration of the Operator's management accounts submitted in accordance with this Clause 22.1.2.

22.2 The Operator shall provide TransKarachi with all information as TransKarachi may be required to provide to any Regulatory Bodies, from time to time.

22.3 The Operator's financial statements shall be prepared in accordance with IFRS (international financial reporting standards within the meaning of Companies Act, 2017 as applicable in Pakistan) and shall fairly reflect the financial position of the Operator as at the date and for the period for which such statements are prepared.

22.4 The Operator shall furnish to TransKarachi, within three (3) Business Days of receipt by it of written demand from TransKarachi, all such additional information as may be reasonably required by TransKarachi from time to time.

22.5 The Operator shall notify TransKarachi in writing, immediately (but in all events within seven (7) days) upon the occurrence of any of the following events:

22.5.1 if at any time the Operator becomes Financially Distressed; or

22.5.2 if the Operator considers or resolves to seek any insolvency, bankruptcy or similar protection under Applicable Law.

22.6 If the Operator notifies TransKarachi pursuant to Clause 22.5, such notice shall set out the full details of the Financial Distress or the actual or proposed action, and TransKarachi shall be entitled, without derogating from and/or diminishing any rights and/or entitlements it may have under this Agreement, under Applicable Law or otherwise, to do all things it deems necessary in order prevent any potential disruption to the Services.

23. Incident Reporting

23.1 Should the Operator become aware of events or circumstances which have prevented, are preventing or will prevent the Operator from providing the Services, the Operator shall immediately after becoming so aware, advise TransKarachi of such events or circumstances and also indicate the manner in which the provision of the Services were, are or are going to be impacted.

23.2 In addition to any obligations under Applicable Law, the Operator shall immediately after its occurrence notify TransKarachi or its Authorised Representative of any accident relating to the Services (whether or not a Vehicle has been involved and including accidents at the Depot) in which persons have been injured or killed.

23.3 The Operator shall be required to report all other incidents as may be further defined by a Protocol, excluding such incidents as described in Clause 23.2 above, to TransKarachi in writing within two (2) Business Days of the Operator becoming aware or where a prudent operator should have reasonably become aware of the incident.

23.4 The Operator shall report:

23.4.1 any acts of vandalism or damage to the Stops and/or Stations;

23.4.2 the obvious need for cleaning of Stops; and

23.4.3 the use of the Stops by trespassers,

to TransKarachi within one (1) day of becoming aware of their occurrence or where a prudent operator should have reasonably become aware of their occurrence.

24. Other responsibilities

24.1 The Operator shall be responsible for the safe disposal of waste, oil, lubricant or water containing any variation of such lubricant in accordance with the Applicable Law.

24.2 The Operator shall at its own cost comply with all labour, employment, occupational health and safety regulations and standards applicable to the Services.

24.3 The Operator shall be liable for and pay all traffic fines incurred as a result of the use of the Vehicles.

24.4 TransKarachi will either take waiver of terminal fee, toll fee, or adda fee (if any) on Route of operation or pay the fees directly to the relevant Government agency. If no waiver granted to TransKarachi or paid directly by TransKarachi, the Operator shall pay terminal fee, toll fee, add fee (if any) in the city on Route of operations, and TransKarachi shall reimburse such costs to Operator on actual costs basis upon producing proof and will be paid on rate notified by Government for the terminal, adda or toll.

24.5 The Operator shall be responsible for provision and maintenance of terminal facilities for its staff on Off-Corridor routes.

24.6 The Operator shall depute at least one person in control centre during operation hours for effective co-ordination with TransKarachi.

24.7 The Operator shall timely pay the cost of all electricity, water and other utilities consumed at Terminal (On-Corridor or Off-Corridor routes).

24.8 The Operator shall do all facilitation of TransKarachi in inaugurating month of the BRT System and shall bear the cost of any incident or misuse of BRT vehicles by passengers, public or any other third parties and must recoup all missing equipment and do necessary repair, if required.

24.9 The Operator shall be responsible for provision of diesel fuel tank/ fuel pump and relevant civil works for the provision of same. TransKarachi will allocate space in Depot for the construction and installation of diesel fuel storage/fuel pump. The Operator will be responsible for obtaining of licensing/NOC from the Government under Applicable Law for installation of diesel fuel tank/fuel pump. TransKarachi will facilitate Operator in this regard.

24.10 The Operator shall, at the end of each Trip, clean the Vehicle. The Operator shall also wash the Vehicles on daily basis.

PART D - MAINTENANCE OF VEHICLES

25. General Obligations

25.1 The Operator shall, at all times during the term of this Agreement, ensure that all Vehicles utilised in rendering of the Services are kept in a state of good repair and maintained in accordance with the Vehicle Supplier requirements and/or recommendations and the provisions of this Agreement. Notwithstanding anything to the contrary contained in this Agreement, the Operator shall:

25.1.1 be liable for any damage caused to the Vehicles in accordance with its obligations under this Agreement; and

25.1.2 at all times, unless expressly stated otherwise in this Agreement, be responsible for the service, maintenance and upkeep of the Vehicles, including during the Initial Maintenance Period.

26. Maintenance

26.1 The Operator shall at all times be required to service, maintain and repair the Vehicles at its own cost and in strict accordance with the specifications, requirements and/or recommendations of the Vehicle Supplier as notified to the Operator from time to time. The Operator shall not do anything which has the effect of voiding any warranty provided by a Vehicle Supplier in respect of any of the Vehicles. The Operator shall do all things required to ensure that TransKarachi does not in any way breach its obligations under the Vehicle Sale Agreement.

26.2 During the Initial Maintenance Period the Vehicle Supplier will supervise maintenance of Vehicles carried out by the Operator.

26.3 The Operator shall, at its own cost, ensure that each Vehicle undergoes a vehicle emissions test/Vehicle inspection test according to Applicable Law, and the results and other records relating to such tests shall be maintained and made available to TransKarachi at its request. TransKarachi may, in its discretion, request that the results of each such test be forwarded to TransKarachi within seven (7) days of the completion of each such test.

26.4 If at any time a Vehicle is in need of service, maintenance and/or repair and the Operator, in the opinion of TransKarachi, fails to make such repair within a reasonable time, TransKarachi shall notify the Operator of such failure and shall indicate in that notice the type of service, maintenance and/or repair that is required and the period within which such service, maintenance and/or repair must be completed. If such service, maintenance and/or repair is not completed within the time specified in TransKarachi's notice, TransKarachi shall be entitled to effect such service, maintenance and/or repair at the cost and expense of the Operator in which case TransKarachi may, in its discretion, liquidate partially or fully the Performance Guarantee or pursue the reimbursement of its costs and expenses by accessing the Reserve Fund.

26.5 The Operator shall maintain a complete and detailed record of all service, maintenance and/or repairs (including the cost of any such service) for each Vehicle and shall, upon reasonable notice, make such records available to TransKarachi for audit and/or inspection.

27. Reserve Fund

27.1 The Operator shall establish the Reserve Fund which shall be maintained by TransKarachi as security against amounts which may become due and payable to TransKarachi during the term of this Agreement.

27.2 The Reserve Fund shall be built up from amounts retained by TransKarachi from payments due to the Operator. TransKarachi shall retain no more than [three percent (3%)] of each payment due to the Operator, up to PKR [100,000,000 (one hundred million).]

27.3 Subject to Clause 27.4 below, TransKarachi shall be entitled to, in accordance with the express terms of this Agreement, make withdrawals from the Reserve Fund at any time after the Commencement Date.

27.4 The Operator shall name TransKarachi as a co-beneficiary on the Reserve Fund account and execute all documents and do all things necessary to ensure that the bank or other financial institution with whom the Reserve Fund is established is authorized and empowered to, upon first written demand from TransKarachi, immediately withdraw and/or transfer the demanded amounts to TransKarachi without regard to any objections to TransKarachi's demand from the Operator.

27.5 Prior to making any withdrawal from the Reserve Fund, TransKarachi shall notify the Operator of the Operator's breach of a specific obligation under the Agreement, and shall also provide relevant details in respect of the breach (including the details of the Operator's failure to remedy the breach within the time agreed and/or specified by TransKarachi).

27.6 TransKarachi shall, prior to making a withdrawal or as soon as practicable following a withdrawal from the Reserve Fund, provide details of the amount to be withdrawn or the amount that has been withdrawn, and purpose of use. Following a withdrawal, the Operator shall, within the period specified by TransKarachi or agreed between the Parties, replenish the Reserve Fund in a manner prescribed in Clause 27.2. Failure of the Operator to replenish the Reserve Fund following a withdrawal pursuant to this Clause shall constitute a material breach of this Agreement.

27.7 If, upon the expiry of the term of the Agreement or its earlier termination or the termination of the Operator's employment under the Agreement, no amounts are due and/or payable to TransKarachi under this Agreement, then the Operator shall (within fourteen (14) days of such expiry or termination), be entitled to liquidate the Reserve Fund and retain any and all amounts remaining therein.

28. Spare Parts

28.1 The Operator is required to provide a suitably stocked and secure spare parts store as well as suitably qualified staff members to manage such store in accordance with the Operational Specifications Schedule.

28.2 Unless expressly agreed otherwise, the Operator shall be responsible for the provision of all spare parts required for the performance of the Services.

28.3 TransKarachi will, at no additional charge or cost to the Operator, provide the Operator with an initial limited stock of spare parts for the Vehicles listed in the Operational Specifications Schedule during the Initial Maintenance Period. To the extent any spare part is required for the performance of the Services which is not provided by TransKarachi, the Operator shall be responsible for providing the same at its own cost and expense.

28.4 Upon delivery of any spare part(s) from TransKarachi to the Operator, the Parties shall jointly inspect and record the delivery and acceptance of such spare parts and the record of such delivery/acceptance must be retained by the Operator and produced to TransKarachi upon request.

28.5 The specific spare parts for the different Vehicle types which TransKarachi may provide are set out in more detail in the Operational Specifications Schedule.

29. Tools and equipment

29.1 The Operator is required to provide the required tools and equipment to maintain the Vehicles and/or otherwise to provide the Services in accordance with the Operational Specifications Schedule.

29.2 To the extent that TransKarachi has agreed to assist the Operator in providing the tools and equipment, the Operator shall be responsible for the care and safekeeping of this equipment and shall be required to replace and supplement any missing equipment. All tools and equipment supplied by TransKarachi shall become property of the Operator on the Termination Date, subject to Clause 38.4 of this Agreement.

29.3 Upon delivery of any tools and/or equipment from TransKarachi to the Operator, the Parties shall jointly inspect and record the delivery and acceptance of such tools and/or equipment and the record of such delivery/acceptance must be retained by the Operator and produced to TransKarachi upon request.

29.4 The tools and equipment for the different Vehicle types which TransKarachi will provide are set out in more detail in the Operational Specifications Schedule.

30. Fuel stocks

30.1 The Operator shall, for the duration of the Agreement, irrespective of actual or anticipated fuel delivery stoppages or shortage of fuel and electricity supply, ensure that it maintains, at its own cost, at all times adequate levels of fuel, in order to ensure a seamless and uninterrupted delivery of the Services. For purposes of this Clause 30.1 adequate levels of stock shall mean at least two (2) days' supply of the relevant types of fuel. The Operator shall be responsible for obtaining, at its own cost, any fuel storage licences to the extent required by the Applicable Law.

30.2 TransKarachi shall be entitled to conduct random spot checks to ensure that sufficient fuel levels are maintained and that the aforesaid contingency plans are in place.

30.3 The Operator shall provide TransKarachi, upon its request, fuel consumption data per Vehicle type. The fuel consumption data shall be presented in a programmed automated report generated by an automated fuel system approved by TransKarachi.

PART E - AUTHORISED REPRESENTATIVES, PROTOCOLS AND SERVICES NOTICES

31. Authorised Representative

31.1 TransKarachi and the Operator shall notify each other, by no later than five (5) days after the Effective Date, of the identity and contact details of their Authorised Representatives. Each Party shall be entitled to replace such Authorised Representative by notice to the other Party.

31.2 In addition to TransKarachi's Authorised Representative, TransKarachi shall, by written notice to the Operator, be entitled to engage a System Controls Service Provider and/or otherwise delegate from time to time certain of its obligations under this Agreement. TransKarachi shall clearly specify the responsibility(ies) and/or authority(ies) of such delegate in the notice to the Operator. The Operator agrees to cooperate fully with any such delegate as a representative of TransKarachi.

31.3 Unless it is stated otherwise in the notice of a Party, a Party's Authorised Representative shall be entitled to bind such Party for any and all purposes connected with this Agreement.

31.4 All Service Notices and other notices required under or pursuant to this Agreement, unless expressly stated otherwise in this Agreement (or instructed in writing by the Party to whom notice is to be given) shall be directed to the Authorised Representative of such Party.

31.5 Without derogating from the generality of this Clause 31, TransKarachi and the Operator, as the case may be, shall be entitled to appoint further Authorised Representative(s) for specific matters as detailed in its notification of such Authorised Representative.

32. Service Notices, Protocols and Amendments

32.1 TransKarachi shall be entitled to amend the VOC Dispatch Schedule and Headway Targets, Scheduled Positioning Kilometres, types and number of Vehicles on routes, Stops and Routes (include addition & deletion of Routes and Stops) (and the allocation of any of the aforementioned, Staging Area, or a Service) or to give notice of an Event Service or a Charter Service, from time to time, in accordance with Clause 32.3. Such amendments shall be subject to the availability of required Vehicles and the provisions of this Agreement in respect of applicable notice periods.

32.2 [TransKarachi also envisioned second operator, to whom TransKarachi will grant non-exclusive license for use of [•]. TransKarachi shall be entitled to define Protocols for facilitation of both Operators regarding use of Corridor, Staging Area, Depot and common facilities.][1]

32.3 In the event that TransKarachi wishes to amend the items listed in Clause 32.1 above, it shall do so by delivery of a Service Notice to the Operator in which case the following notice periods shall apply:

Amendment	**Service Notice Period shall not be less than**
Routes, Schedule and/or Stops, where no changes to Operating Licences are required	Seven (7) days
Routes, Schedule and/or Stops where changes to Operating Licences are required	Ten (10) Business Days, provided that the Operator need not start operation of the amended Schedule, and/or Stop before the Operating Licence is granted
Event Services	Three (3) days, or less by agreement between the Parties
Charter Services	One (1) day
Allocation of Space for Parking of Vehicles in Staging Area at night or day time or at any other location e.g. corridor, depot, parking space	One (1) day

32.4 Notwithstanding Clause 32.3:

32.4.1 where amendments due to an emergency are required by TransKarachi in circumstances where the requisite notice periods cannot be adhered to, but except in relation to Event Services or Charter Services, TransKarachi shall be entitled to issue such instructions as it may deem necessary without complying with the provisions of Clause 32.3; or

32.4.2 where amendments due to urgent operational requirements are required by TransKarachi, the provisions of Clause 32.4.1 shall apply *mutatis mutandis*, save that TransKarachi shall provide at least seven (7) days' notice of such amendment; or

32.4.3 in cases where the urgent operational requirements demand less than seven (7) days' notice, TransKarachi shall first consult with the Operator, and

the Operator shall be obliged to comply with such notice except in circumstances where it, on reasonable grounds, does not have the relevant Vehicle and a necessary Driver available.

32.5 TransKarachi shall be entitled to issue reasonable Protocols or amend previously issued Protocols on twenty-four (24) hours' notice to the Operator in the case of urgent matters and on seven (7) days' notice in respect of all other matters.

32.6 Should TransKarachi issue a Service Notice or Protocol in accordance with this Agreement and the implementation of such Service Notice or Protocol is likely to result in a material increase or decrease in the Operator's costs and/or expenses (which are not already remunerated through the payments made or to be made to the Operator):

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[1] ***DWF comment**: TBC*.

32.6.1 the Operator shall be obliged to implement the Service Notice or Protocol, as the case may be, irrespective of the materiality of the expense; and

32.6.2 the Parties shall negotiate with each other in good faith in order to agree an acceptable adjustment to the relevant category of payment in respect of the Operator’s costs and/or expenses,

provided that, if either Party alleges that the Service Notice or Protocol materially increases or decreases the Operator’s costs and/or expenses (which are not in Services/scope of work and not already remunerated through the payments made or to be made to the Operator), such Party shall be obliged to submit to the other, reasonable proof of such material increase or decrease in the Operator’s expenses, as the case may be and such material increase or decrease shall be dealt with in accordance with the provisions of Clauses 32.6.2 and 32.7. Parties are required to indicate such material increase or decrease ahead of execution/implementation.

32.7 If the Parties are unable to reach agreement through negotiations contemplated in Clause 32.6.2 within seven (7) days of request by either Party to commence such negotiations, the matter shall be referred for dispute resolution in accordance with the provisions in Clause 39 (*Dispute resolution*).

32.8 For purposes of Clause 32.6 above, a “material” increase or decrease in the Operator’s expenses shall mean an aggregate of all increases and decreases per year (calculated from the Commencement Date and for each ensuing year thereafter) exceeding one percent (1%) of the average Monthly payments to the Operator. The average Monthly payments to the Operator shall be calculated over the preceding twelve (12)-Month period or if within the first twelve (12)-Month period, then the average Monthly payments to the Operator shall be calculated based on the number of months from the Commencement Date until the date of calculation.

PART F – PERFORMANCE DEDUCTION PERCENTAGES

33. Performance Deduction Percentages

33.1 TransKarachi shall be entitled to impose Performance Deduction Percentages on the Operator in accordance with the provisions of this Clause and the Operational Specifications Schedule for the Operator’s failure to achieve certain KPIs as indicated in the Operational Specifications Schedule.

33.2 The Operator waives, to the extent permitted by Applicable Law, any defence as to the validity and quantum of Performance Deduction Percentages set out in this Agreement on the grounds that such Performance Deduction Percentages are void as penalties or otherwise.

33.3 TransKarachi shall be entitled to conduct audits of the Operator’s operations at any time without notice in order to ensure the continued compliance with this Agreement and that the Operator continues to achieve the various indicated KPIs. Such audits may be conducted in relation to the Vehicles, the Depot, the Staging Area, Stations, Operator’s staff, Operator’s offices (including service and performance records) and any other place where any element of the Service is being performed.

33.4 To the extent that TransKarachi discovers an instance of the Operator’s failure to achieve a particular KPI, TransKarachi shall notify the Operator with details of the particular KPI, the details of the failure and the applicable Performance Deduction Percentages as indicated in the Operational Specification Schedule. TransKarachi may at its discretion specify period and type of certain failure which should be cured/rectified in a specific period.

33.5 If Performance Deduction Percentages are imposed, then TransKarachi shall be entitled to withhold and/or deduct the imposed amounts from the Operator’s next payable invoice, any subsequent invoice or in increments from several subsequent invoices. TransKarachi shall be entitled to, in its sole discretion, waive (whether wholly or partially) any Performance Deduction Percentages that are imposed on the Operator.

33.6 The maximum amount of Performance Deduction Percentages that may be imposed on the Operator in any given month is as indicated in the Operational Specification Schedule.

PART G – WARRANTIES AND CHANGE IN OWNERSHIP

34. Warranties, Undertakings and Indemnities

34.1 Operator Warranties

34.1.1 The Operator acknowledges that TransKarachi has entered into this Agreement relying on the strength of the warranties given to TransKarachi by the Operator and that the warranties are given with the intention of inducing TransKarachi (which has been so induced) to enter into this Agreement on the basis that such warranties are and shall be correct for the duration of this Agreement.

34.1.2 Each Operator Warranty shall be a separate Warranty and in no way limited or restricted by any reference to, or inference from, the terms of any other Warranty or by any other provision in this Agreement.

34.1.3 The Operator accordingly warrants and undertakes that:

(a) it is properly constituted and incorporated in accordance with the Applicable Law;

(b) it has the power, authority and legal capacity to enter into and exercise its rights and perform its obligations under this Agreement;

(c) it has taken all necessary action to authorise the execution, delivery and performance of this Agreement;

(d) the obligations expressed to be assumed by the Operator under this Agreement are legal, valid, binding and enforceable to the extent permitted by Applicable Law;

(e) it will as at [•], hold, in cash, an amount equivalent to the acquisition cost of all required tools, equipment, furniture and other basic business materials required for the operating of its business, plus the necessary working capital required during the pre-operational and initial operational period;

(f) it is and will be in compliance with all Applicable Laws;

(g) the Operator and its shareholders, are not subject to any obligation, non-compliance with which is likely to cause a material breach of this Agreement;

(h) it is a special purpose company established in connection with the Project and it has not carried out any activity since the date of its incorporation as a company, other than in connection with the Project;

(i) no claim is presently being assessed and no litigation, arbitration or administrative proceedings are presently in progress or, to the best of the knowledge of the Operator, pending or threatened against it (including its shareholders) or any of its assets which will or might have a material adverse effect on the ability of the Operator to perform its obligations under this Agreement;

(j) it is not the subject of any other obligation, compliance with which will or is likely to have a material adverse effect on the ability of the Operator to perform its obligations under this Agreement;

(k) no proceedings or other steps have been taken and not discharged (nor threatened) for its winding-up or dissolution or for the appointment of a receiver, administrative receiver, administrator, liquidator, trustee or similar officer in relation to any of its assets or revenues;

(l) all information disclosed by or on behalf of the Operator to TransKarachi is true, complete and accurate in all material respects and the Operator is not aware of any material facts or circumstances not disclosed to TransKarachi which would, if disclosed, be likely to have an adverse effect on TransKarachi’s decision (acting reasonably) to award this Agreement to the Operator;

(m) it is not in breach of the provisions relating to Restricted Companies as set out in this Agreement; and

(n) all insurance premiums in respect of insurance obligations placed on the Operator in accordance with this Agreement have been timely paid and none are in arrears.

34.2 Operator Undertakings

The Operator undertakes with TransKarachi that:

34.2.1 it will give TransKarachi immediate notice upon becoming aware that any judicial or court proceedings, mediation, litigation, arbitration, administrative or adjudication by or against the Operator before any court or Regulatory Body may be threatened or pending;

34.2.2 it will not without the prior written consent of TransKarachi (and whether by a single transaction or by a series of transactions whether related or not) sell, transfer, lend, encumber or otherwise dispose of the whole or any part of its business or assets;

34.2.3 it will not cease to be lawfully registered in the Islamic Republic of Pakistan or transfer in whole or in part its undertaking, business or trade outside the country;

34.2.4 it shall not without the written consent of TransKarachi incorporate any company or purchase or acquire or subscribe for any shares in any company save where such company is involved in the provision of the Services;

34.2.5 it shall not without the prior written consent of TransKarachi make any loans or grant any credit or give any guarantee or indemnity to or for the benefit of any person or otherwise voluntarily or for consideration assume any liability (whether actual or contingent) in respect of any obligation of any other person except as contemplated by this Agreement;

34.2.6 it shall not change or cease its business or start any other business which is materially different from that to be carried on by it under this Agreement;

34.2.7 it shall immediately notify TransKarachi of any discussions and/or negotiations that may result in a change in the ownership structure of the Operator or its ultimate parent company (if applicable).

34.3 TransKarachi and Operator Indemnities

34.3.1 The Operator shall take steps to ensure the safety of property and all persons while they are being conveyed on the BRT System or while they are in, entering or leaving premises under the control of the Operator. In particular, the Operator shall be responsible for passengers whilst they are on a Vehicle and for passengers whilst they are embarking on or disembarking off such Vehicle.

34.3.2 The Operator shall be liable for any loss or damages resulting from damage to property including TransKarachi's property, or the death of or injury to any person which is caused directly or indirectly by an intentional or negligent act or omission of the Operator, its agents, Employees or sub-contractors.

34.3.3 The Operator indemnifies and agrees to hold TransKarachi harmless against all claims, demands, suits, proceedings, judgments, damages, loss, costs, charges, fines, penalties, taxes and expenses, of whatsoever nature incurred by either of the Parties, or by any third party, in consequence of a failure by the Operator to comply with the terms of this Agreement or any Applicable Law.

34.3.4 Nothing contained in this Clause 34.3 shall be deemed to render the Operator liable for, or require it to indemnify TransKarachi against, any compensation or damages with respect to injuries or damage to persons or property resulting from any negligent act or omission of TransKarachi or its agents or employees in respect of any claims, demands, lawsuits, damages, costs, charges and expenses in respect thereof or pertaining thereto, and each Party hereby indemnifies the other against any claims, demands, lawsuits, damages, costs, charges and expenses incurred by such other Party in consequence of the negligent acts or omissions of the other Party’s agents or employees.

34.4 All warranties, representations, undertakings, indemnities and other obligations made, given or undertaken by the Operator in this Agreement are cumulative and none shall be given a limited construction by reference to any other.

35. Change in Ownership

35.1 The Operator agrees that there shall be no Change in Ownership of the Operator during the Lock-in Period.

35.2 Any change in the ownership structure of the Operator arising as a consequence of:

35.2.1 the grant or enforcement of security in favour of lenders over or in relation to any of the shares of the Operator, provided that any document conferring security over any shares has been approved by TransKarachi (such approval not to be unreasonably withheld or delayed); or

35.2.2 any change in legal or beneficial ownership of any shares that are listed on a recognised investment exchange; or

35.2.3 any transfer of shares in the Operator by its ultimate parent and/or an affiliate of its ultimate parent to its ultimate parent and/or an affiliate of its ultimate parent,

shall not constitute a Change in Ownership for purposes of this Clause.

35.3 The Operator shall obtain TransKarachi’s prior written consent (which may be given subject to conditions) to any Restricted Share Transfer.

PART H - FORCE MAJEURE, NECESSARY ACTION, BREACH, TERMINATION AND DISPUTE RESOLUTION

36. Force Majeure

36.1 If either Party is prevented in whole or in part from discharging its obligations pursuant to this Agreement as a result of an Event of Force Majeure, such Party shall, as soon as reasonably practicable, notify the other Party accordingly. The aforementioned notice shall contain the following information:

36.1.1 the obligations which are affected and the extent to which the relevant Party cannot perform those obligations;

36.1.2 a detailed description of the Event of Force Majeure;

36.1.3 an estimate of the time period which the Event of Force Majeure is envisaged to continue; and

36.1.4 the measures proposed to be adopted to remedy or minimise the effects of and costs arising from the Event of Force Majeure. If the Operator is the Party prevented from discharging its obligations as a result of the Event of Force Majeure and TransKarachi is of the opinion that the measures proposed are not adequate, it shall advise the Operator by Service Notice. Such Service Notice may propose alternate or additional measures which in the opinion of TransKarachi may curtail the Event of Force Majeure and/or the costs arising therefrom. Notwithstanding the provisions of this Clause 36.1.4, the Operator shall be obliged to take all proactive steps as may be reasonably possible in anticipation of Events of Force Majeure so as to enable the Operator to mitigate the financial effects thereof, including but not limited to, the entering into of appropriate contractual arrangements with its Employees.

36.2 The Party prevented from discharging its obligations pursuant to this Agreement as a result of an Event of Force Majeure shall:

36.2.1 use all reasonable endeavours to remedy or minimise the effects of the Event of Force Majeure; and

36.2.2 take all reasonable and necessary steps available to it as contemplated in Clause 36.1.4 to mitigate any loss suffered by such Party or the other Party or any passengers as a result of that Party's failure to discharge its obligations pursuant to this Agreement.

36.3 In the event that an Event of Force Majeure affects the Operator's ability to perform any of its obligations under this Agreement and to the extent that the Services, or any part thereof, are suspended, the Operator shall not be entitled to claim payment from TransKarachi for such suspended Services, or any additional costs incurred by the Operator as a result of the Event of Force Majeure or in relation to any steps taken by the Operator in mitigating the effects of the Event of Force Majeure.

36.4 In the event that the Operator is the Party affected by an Event of Force Majeure, TransKarachi may, in response to the notice issued by the Operator in accordance with Clause 36.1, issue a Service Notice to the Operator indicating any part of the Services which should nonetheless be performed by the Operator for the period during which the Event of Force Majeure subsists. TransKarachi shall in such event make payment to the Operator for such Services in accordance with the Payment Calculation Schedule.

36.5 If an Event of Force Majeure no longer prevents the Operator from performing its obligations under this Agreement, the Operator shall be entitled to a reasonable period, taking into account the extent to which it has wound down its operations during the period of the Event of Force Majeure, to re-establish the Services in compliance with its obligations under this Agreement.

36.6 If an Event of Force Majeure continues uninterrupted for more than one hundred eighty (180) days and continues to prevent a Party from performing all of its obligations under this Agreement, either Party shall be entitled to terminate this Agreement upon fourteen (14) days' notice to the other Party, provided that before doing so the Parties shall first have met to find a mutually satisfactory solution for remedying such Event of Force Majeure and no Party shall terminate this Agreement unless the Parties are unable to agree on a solution.

36.7 Neither Party shall have any liability to the other in respect of the termination of this Agreement as a consequence of an Event of Force Majeure or as a result of any failure to carry out any of its obligations hereunder resulting from an Event of Force Majeure.

37. Step-in and Necessary Action

37.1 If the Operator commits a material breach of this Agreement to such an extent that TransKarachi is compelled to step in in order to ensure that the Services or any part thereof are continued seamlessly or if TransKarachi reasonably believes that the Operator is unable to perform the Services or a substantial part thereof in the manner contemplated in this Agreement, TransKarachi shall be entitled to give the Operator a notice.

37.2 The notice pursuant to Clause 37.1 shall set out:

  37.2.1 details of the material breach or reasons for TransKarachi's belief (and shall refer to previous relevant notifications, if any) that the Operator is or will be unable to provide the Services or any part thereof;

  37.2.2 the remedial action which the Operator should take within the period specified by TransKarachi; and

  37.2.3 the date upon which TransKarachi intends to commence the Necessary Action in the event that the Operator fails to take remedial action.

37.3 In the event that the Operator fails to take such remedial action within the period specified in TransKarachi's notice, TransKarachi shall be entitled to proceed to take the Necessary Action at the Operator's cost and expense, and may, in its discretion, liquidate partially or fully the Performance Guarantee or pursue its reimbursement of costs and expenses by accessing the Reserve Fund.

37.4 The Operator hereby agrees that TransKarachi, in taking the Necessary Action, shall be entitled unrestricted access to the Vehicles, the Depot and any other places where the Services (or any part of them) are being performed and the Operator undertakes to co-operate and do all such things as may be necessary to provide such access to TransKarachi or any third party appointed by TransKarachi and to ensure the seamless operation of the Services or any part thereof.

37.5 If TransKarachi takes the Necessary Action, then without prejudice to any of TransKarachi's remedies under the Agreement or the Applicable Law, for so long as and to the extent that such Necessary Action is taken and prevents the Operator from performing any of its obligations under this Agreement:

  37.5.1 the Operator shall be relieved from such obligations for the duration of the period in which TransKarachi is taking the Necessary Action; and

  37.5.2 without prejudice to TransKarachi's rights to claim damages, the payments due and payable by TransKarachi to the Operator shall equal the amount the Operator would have received if it were performing the obligations affected by the Necessary Action in full over such period, less:

    (o) any outstanding Performance Deduction Percentages imposed, but not yet deducted as calculated in accordance with the provisions of this Agreement; and

    (p) an amount equal to TransKarachi's unrecovered costs and/or expenses incurred pursuant to taking such Necessary Action.

38. Breach and Termination

38.1 If the Operator commits a material breach of this Agreement and fails to remedy the breach within ten (10) Business Days after receipt from TransKarachi of a notice calling upon it to do so or such other time as specified by TransKarachi then TransKarachi shall be entitled, in addition to and without prejudice to any other right it may have under Applicable Law or in accordance with this Agreement, to seek specific performance of this Agreement or to terminate this Agreement forthwith on notice to the Operator and in either event, to recover such costs, losses and damages as it may have sustained.

38.2 For purposes of this Agreement, a material breach shall include but not be limited to the foregoing if the Operator:

  38.2.1 fails to provide or maintain the Performance Guarantee; or

  38.2.2 fails to provide or maintain the Parent Company Guarantee; or

  38.2.3 fails to provide or maintain the Reserve Fund; or

  38.2.4 at any time, is Financially Distressed; or

38.2.5 in the opinion of TransKarachi, commits a Prohibited Act; or

38.2.6 makes a compromise with its creditors or an assignment in favour of its creditors; or

38.2.7 agrees to carry out this Agreement under the supervision of a committee representing its creditors; or

38.2.8 goes into liquidation, whether provisionally or finally (other than a voluntary liquidation for the purpose of amalgamation or reconstruction to which TransKarachi has given its prior written consent); or

38.2.9 sells, transfers or otherwise disposes of all or a substantial portion of its shares, assets or business, without the prior written consent of TransKarachi; or

38.2.10 has judgment of a material nature taken against it likely to affect the Operator's status as a going concern and fails to satisfy or apply to have the same set aside within seven (7) days of becoming aware thereof; or

38.2.11 delegates, cedes or sub-contracts this Agreement or part thereof in contravention of the provisions hereof without having obtained TransKarachi's prior written consent; or

38.2.12 commits a material breach as per Clause 3.6 of the Operational Specifications Schedule; or

38.2.13 fails to obtain or maintain as required any of the necessary Operating Licences/permits to be used in the rendering of the Services or has such necessary Operating Licences withdrawn, cancelled, suspended or revoked; or

38.2.14 acts or attempts to act in a fraudulent or otherwise illegal manner in obtaining or executing a contract with any government department, provincial administration, municipality, public body, company or person; or

38.2.15 violates or attempts to violate any Applicable Law or otherwise commits any criminal act; or

38.2.16 enters into any agreement or arrangement, whether legally binding or not, with any other person, firm or company to refrain from formally responding to TransKarachi's calls for proposals or the entering into of any negotiations with TransKarachi in relation to this Agreement; or

38.2.17 Abandons, suspend services or otherwise repudiates the Services or any of its obligations under this Agreement; or

38.2.18 consistently fails to observe any provision of this Agreement or the Operational Specifications Schedule (despite being given notice in relation thereto), whether or not Performance Deduction Percentages have been applied, with the result that the Services may be regarded by TransKarachi as being materially defective; or

38.2.19 incurs Performance Deduction Percentages equal to or exceeding the maximum amount of Performance Deduction Percentages as indicated in the Operational Specifications Schedule consecutively for few months.

38.3 If TransKarachi:

38.3.1 commits a material breach of this Agreement (other than a breach of payment obligations) and fails to remedy the breach within ten (10) Business Days after receipt from the Operator calling upon it to do so; or

38.3.2 commits a breach of any payment obligation in accordance with this Agreement and fails without justification to make payment within thirty (30) Business Days after receipt from the Operator of a notice calling upon it to do so,

then the Operator shall be entitled, in addition to and without prejudice to any other right it may have under Applicable Law or under the terms of this Agreement, to seek specific performance of the terms of this Agreement or to terminate this Agreement upon sixty (60) days' notice to TransKarachi and in either event, to recover such costs, losses and damages as it may have sustained.

38.4 In the event of termination of this Agreement:

38.4.1 TransKarachi shall be entitled to immediately take possession of all Vehicles and the Depot and the Operator shall be required to surrender its Operating Licences/permits and do all things necessary to transfer ownership of the Vehicles and other assets required for the performance of the Services to TransKarachi; and

38.4.2 TransKarachi may immediately appoint auditors to check and verify all relevant books, records and other data of the Operator and the Operator shall give full cooperation in that regard and make all such information available to TransKarachi on request.

39. Dispute resolution

39.1 Disputes

39.1.1 For the purposes of this Clause 39, the term "dispute" shall be interpreted in its widest sense and shall include any dispute or difference in connection with or in respect of the conclusion or existence of this Agreement, the carrying into effect of this Agreement, the interpretation or application of the provisions of this Agreement, the Parties' respective rights and obligations in accordance with and arising out of this Agreement or the validity, enforceability, rectification, termination or cancellation, whether in whole or in part, of this Agreement.

39.1.2 Save as otherwise provided for in this Agreement, any dispute between the Parties arising in connection with this Agreement shall be resolved in accordance with the provisions of this Clause 39.

39.2 Resolution by Chief Executives

39.2.1 Any dispute arising in connection with this Agreement may be referred by either Party to the Chief Executive of the Operator and the Chief Executive of TransKarachi (or such other senior executives as the relevant Parties may determine) who shall attempt to resolve the matter within ten (10) Business Days of the dispute being so referred to them or within such other time as may be agreed between the Parties.

39.3 Arbitration

39.3.1 If the Parties are unable to resolve the dispute pursuant to Clause 39.2, either Party shall be entitled to refer a dispute to arbitration in accordance with this Clause 39 by notifying the other Party in writing of its intention to do so.

39.3.2 The arbitration proceedings shall be carried out under the procedures, rules and regulations of Arbitration Act, 1940 and its successors, and such procedures, rules and regulations shall be deemed to be incorporated into this Clause 39.3 by reference. Any such arbitration shall be subject to the Applicable Law.

39.3.3 The seat of the arbitration shall be Pakistan and all arbitration hearings shall be held in Karachi unless otherwise agreed in writing by the Parties.

39.3.4 Unless otherwise required by TransKarachi, such arbitration shall be conducted in the English language and the award of any arbitrator or arbitral panel, together with the reasons for the determination, shall be written in the English language.

39.3.5 Unless otherwise required by TransKarachi, all evidence, submissions or documents presented at the arbitration in a language other than in the English language shall be accompanied by a simultaneous English language translation thereof, if oral, or if written, a certified English language translation.

39.3.6 The arbitrator or arbitral panel shall have full power to open up, review and revise any determinations, decisions or findings in relation to the dispute.

39.3.7 The obligations of the Parties shall not be altered by reason of the arbitration being conducted during the term of the Agreement.

39.3.8 Any monetary award in any arbitration shall be denominated and payable in PKR.

39.3.9 The Parties agree that all interim or final decisions and/or awards of the arbitrator or arbitral panel shall:

(a) be binding on the Parties and shall be given effect and implemented forthwith by them; and

(b) be subject to the confidentiality restrictions in this Agreement and except as provided by agreement between the Parties, may not be publicised or otherwise disclosed provided always that nothing in this Clause shall prevent either Party from applying to any court of competent jurisdiction to enforce the award.

39.3.10 The Parties hereby expressly agree irrevocably to waive all rights and recourse to appeal or challenge, and neither Party shall request the local courts to open up, revise or review, the final award of the arbitrator or arbitral panel save and except in the specific instances set out in Arbitration Act, 1940.

39.3.11 Reference of a dispute to arbitration shall not in any way vitiate nor invalidate the Agreement neither shall it be grounds for the Operator to cease performing its obligations nor for TransKarachi to terminate the engagement of the Operator under the Agreement and the Operator shall proceed with its obligations with all due diligence.

PART I - MISCELLANEOUS MATTERS

40. Transfer of employees

40.1 Where TransKarachi terminates this Agreement pursuant to Clauses 36 (*Force Majeure)* or 38 (*Breach and Termination*) or takes the Necessary Action contemplated by Clause 37.2, TransKarachi shall be entitled to have any and/or all contracts of employment held by the Operator for performance of the Services and the Operator hereby undertakes to do all things required and provide all such information in relation to such employees as may be required in order to operate the system subject to compliance with the Applicable Law.

40.2 The Operator shall be liable for any costs incurred by TransKarachi in effecting the employee transfers contemplated in this Clause 40, to the extent applicable and hereby indemnifies TransKarachi in respect of such retrenchment costs.

41. Event Services and Charter Services

41.1 The Operator may be required to operate Event Services and Charter Services utilising such Vehicles as TransKarachi may determine. Such Event Services and Charter Services or the Routes and schedules applicable thereto, will be specified through a Service Notice.

41.2 The Operator shall be entitled to receive payment from TransKarachi in respect of Event Services and Charter Services in accordance with the Payment Calculation Schedule. For the avoidance of doubt, the Operator shall not be entitled to accept payment from any third party for the rendering of Event Services or Charter Services without prior written approval from TransKarachi.

41.3 The Operator shall be required to manage Event Services which may be allocated to the Operator and the Other Operators as determined by TransKarachi, subject to TransKarachi's requirements for the use of a specific type of Vehicle and having regard to the nature of the Event which may, in certain instances, require all the aforesaid operators to render the Event Services in question.

41.4 In the event of the date for a booking of an Event Service being changed, the Scheduled Positioning Kilometres specified in respect of the previous date for such booking will cease to be of any force or effect and TransKarachi shall be entitled to deliver a new Service Notice in respect of the new booking.

42. Hazardous Substances

42.1 The Operator shall ensure that any hazardous materials or equipment used or intended to be used in the provision of the Services are stored safely and in safe keeping in accordance with all Applicable Law, ensure that all such materials are properly and clearly labelled on their containers, promptly inform TransKarachi of all such materials being used or stored and comply with any other reasonable requirement of TransKarachi in respect of such materials and equipment.

43. Intellectual Property

43.1 The Operator acknowledges that it shall not acquire any right, title or interest in or to the Intellectual Property of TransKarachi and that all Intellectual Property developed pursuant to this Agreement (other than Intellectual Property belonging to the Operator or any third party) shall vest exclusively in TransKarachi, save to the extent that the Parties otherwise agree in writing.

43.2 Should the Operator acquire title to any Intellectual Property of TransKarachi or which is developed pursuant to this Agreement by operation of law (thus, where TransKarachi in effect pays for its development) such Intellectual Property (other than Intellectual Property belonging to the Operator or any third party) shall be deemed to have been assigned by the Operator to TransKarachi.

44. Insurance

44.1 The Operator agree to, at their own costs, establish and maintain no less than the minimum types and levels of insurances that are required by Applicable Law.

44.2 The Operator shall also effect and maintain passenger and public liability insurance in relation to the operation of the Vehicles. Such insurance shall, among other things, provide cover in respect of loss or damage suffered by reason of damage to property or death of or injury to any person resulting from any act or omission by Operator, the Drivers or their agents or Employees in connection with the operation of the Vehicles in the provision of the Services. TransKarachi shall be a co-insured party under such insurance and the Operator shall be liable for and pay all premiums in respect of such insurance.

44.3 The Operator shall effect and maintain full comprehensive vehicle insurance (including passenger and public liability) in respect of the Vehicles from insurance company having a minimum rating of AA in long term on behalf of TransKarachi within thirty (30) days from acceptance of Vehicles, on terms and conditions to TransKarachi’s reasonable satisfaction. The Operator shall be liable for and pay all premiums in respect of such insurance. The Operator shall ensure that TransKarachi is registered as co-insured under such insurance policy and provide proof of the insurance to TransKarachi on demand.

44.4 The Operator shall take out public liability cover for risks relating to its operation of the other Services, including, but not limited to, the Depot and the Staging Area, for such amount and on such terms and conditions as are reasonably approved by TransKarachi. TransKarachi shall be a co-insured under any such policy. The Operator shall be liable and pay for the necessary premiums in respect of such insurance.

44.5 TransKarachi shall effect and maintain full comprehensive vehicle insurance in respect of buildings, including but not limited to all windows, buildings, third party installations, to the extent that such installations are not insured by the third party and all risk insurance in respect of the Depot, including insurance in respect of any infrastructure situated on Stations and the Depot. TransKarachi shall be liable for and pay all premiums in respect of such insurance.

44.6 The Operator shall be liable for any claims for passenger liability or public liability which are repudiated by TransKarachi's insurers due to any act or omission of the Operator, its directors, agents or Employees in providing the Services.

45. Publication of compliance or non-compliance with required KPIs

45.1 Notwithstanding anything to the contrary in this Agreement, particularly the provisions of Clause 52 (*Confidentiality*), in order to ensure that the Services are rendered at a consistent and sustainably high level and to increase public awareness of the Services being rendered in accordance with this Agreement, TransKarachi shall, for the duration of this Agreement, be entitled to:

45.1.1 conduct and publish customer satisfaction surveys as it, in its sole discretion, may deem appropriate which may include but not be limited to issues pertaining to punctuality, Driver and Vehicle quality, safety and security and general customer satisfaction levels regarding performance of the Operator and its Employees; and

45.1.2 publish any statistics relating to the overachievement or material underachievement of KPIs by the Operator which may include but not be limited to financial and operational performance, compliance with health and safety obligations and the Operator's compliance with Employee training and/or labour law requirements.

45.2 TransKarachi shall be entitled to formulate its own conclusion regarding the results of the customer satisfaction surveys and the interpretation of TransKarachi's statistics relating to the Operator's performance and shall make such results available to the Operator upon request.

45.3 TransKarachi shall be entitled to publish the results of the customer satisfaction surveys and the above-mentioned statistics together with such additional marketing information as it may deem necessary, in media campaigns designed, among other things, to encourage compliance with expected KPIs and to discourage non-compliance therewith.

45.4 The aforesaid media campaign may include but not be limited to campaigns in traditional print media and/or electronic/social media and may highlight any overachievement or material underachievement of expected KPIs by the Operator from time to time.

46. Periodic review of the Agreement

46.1 In view of the long-term nature of this Agreement and in order to provide a continuous means for the assessment of:

46.1.1 TransKarachi's contract management systems;

46.1.2 opportunities to improve the performance of the Operator in rendering the Services to the benefit of all stakeholders (including passengers utilising the Services); and

46.1.3 various aspects of the relationship between the Parties which would allow for *inter alia* an improvement in conflict resolution and the sharing of information between the Parties,

the Operator acknowledges that TransKarachi will review the provisions of this Agreement every three (3) years for the duration of this Agreement.

46.2 To the extent that TransKarachi wishes to propose any amendment to this Agreement pursuant to such review, such proposal shall be discussed and considered in good faith, but shall not be of any force or effect unless reduced to writing and signed by or on behalf of both Parties. For the avoidance of doubt, should the Parties fail to reach agreement as provided for in this Clause 46, such failure shall not constitute a dispute as contemplated in Clause 39 (*Dispute resolution*).

47. Restricted Companies

47.1 Restricted Companies and/or their shareholders shall not:

47.1.1 be a shareholder in the Operator;

47.1.2 be subcontractors of the Operator, or

47.1.3 be a party to a partnership, joint venture, consortium, arrangement with the Operator regarding any other work relating to services provided by the System Control Service Provider.

48. System stability

48.1 The Parties hereby agree to establish a joint task team comprising TransKarachi, the Operator and the Other Operators to develop proposals for combatting piracy and Route invasions.

PART J - FINAL PROVISIONS

49. Addresses and notices

49.1 The Parties choose for the purposes of this Agreement the following addresses:

49.1.1 TransKarachi: [•]..

49.1.2 The Operator: [•].

49.2 Any legal process to be served on any of the Parties may be served on it at the physical address specified for it in Clause 49.1 and it chooses that address for all purposes under this Agreement.

49.3 Any notice required by this Agreement to be given in writing shall, if given by telefax, email or cell phone-based short message service (“sms”), be regarded as having been given in writing for purposes of this Agreement, provided that the Parties may only utilise sms notification for operational authorisations in circumstances where operational action is required immediately for example, in the case of emergency Route changes, other changes to operations contemplated in this Agreement due to an emergency, Event Service related changes or such similar urgent operational matters.

49.4 Where operational authorisations are required, TransKarachi will issue and log an authorisation number and any relevant notice in accordance with this Clause 49 shall quote such authorisation number.

49.5 A notice to any of the Parties which is sent by registered post in a correctly addressed envelope to the address specified for it in Clause 49.1 shall be deemed to have been received (unless the contrary is proved) within fourteen (14) days from the date it was posted, or which is delivered to the Party by hand at the physical address specified for it in Clause 49.1, shall be deemed to have been received on the day of delivery, provided it was delivered to a responsible person during ordinary business hours.

49.6 Each notice by telefax to a Party at the telefax number specified for it in accordance with Clause 49.1 shall be deemed to have been received (unless the contrary is proved) within four (4) hours of transmission if it is transmitted during normal business hours of the receiving Party or within four (4) hours of the beginning of the next Business Day after it is transmitted, if it is transmitted outside those business hours.

49.7 Any notice by email to a Party at the email addresses of its Authorised Representatives shall be deemed to have been received (unless the contrary is proved) within twenty (20) minutes of transmission if transmitted at any time during which the Services are ordinarily rendered and if transmitted outside such time, within ten (10) minutes of recommencement of the rendering of the Services.

49.8 Any notice by sms to a Party at the mobile numbers of its Authorised Representatives shall be deemed to have been received (unless the contrary is proved) within twenty (20) minutes of transmission if transmitted at any time during which the Services are ordinarily rendered and if transmitted outside such time, within twenty (20) minutes of recommencement of the rendering of the Services.

49.9 Any notice in accordance with this Clause 49 given by sms shall be followed by a telefax or email confirming the contents and date of transmission of such sms.

49.10 Notwithstanding anything to the contrary in this Clause 49, a notice or other communication actually received by any of the Parties (and for which written receipt has been obtained) shall be adequate notice or communication to it notwithstanding that the notice was not sent to or delivered at its chosen address.

49.11 Any Party may by a notice to the other Parties change its physical or postal address, telefax number, email address or mobile number for the purposes of this Clause 49 to any other physical or postal address, telefax number, email address or mobile number provided that the change shall become effective on the seventh (7th) day after the receipt of the notice.

50. Change in Law

50.1 The Operator acknowledges and agrees that it shall take full risk and responsibility for a Change in Law occurring. Notwithstanding the foregoing, if a Change in Law occurs or is imminent that affects the rights and obligations of the Operator under this Agreement, the Operator shall notify TransKarachi within fourteen (14) days of the date of such Change in Law occurring or (if earlier) coming to the attention of the Operator and the Parties shall discuss the effects of the Change in Law and endeavour to arrive at a resolution.

50.2 Any resolution reached between the Parties shall be recorded in writing and such record shall be signed by both Parties. The Operator acknowledges and agrees that any decision to change the financial accordance with the Agreement or vary the scope of Services as a result of the Change in Law shall be adjusted with mutual consent of the parties.

51. Remedies

51.1 No remedy conferred by this Agreement is intended to be exclusive of any other remedy which is otherwise available at law, by statute or otherwise. Each remedy shall be cumulative and in addition to every other remedy given hereunder or now or hereafter existing at law, by statute or otherwise. The election of any one or more remedy by any of the Parties shall not constitute a waiver by such Party of the right to pursue any other remedy.

52. Confidentiality

52.1 Each Party shall at all times keep in confidence the Confidential Information of the other Party which it may acquire for the purposes of or in connection with this Agreement (whether prior to or after the Commencement Date) and shall not use or permit the use of such Confidential Information and shall procure that its employees shall not use the Confidential Information, for any other purpose and shall not disclose such Confidential Information to any third party.

52.2 Notwithstanding Clause 52.1, a Party may disclose the Confidential Information of the other Party to such former Party’s employees or Authorised Representatives to the extent that such employees or Authorised Representatives need to know the Confidential Information and shall ensure that such employees or Authorised Representatives are aware of and comply with, the confidentiality obligations contained in this Clause 52.

52.3 Each Party shall take all such steps as may be reasonably necessary to prevent the Confidential Information of the other Party from falling into the hands of an unauthorised third party.

52.4 The Operator shall not make any comments to the media relating to this Agreement and any related matter nor shall it respond to any queries from the media without the prior written approval of TransKarachi.

53. Severance

53.1 In the event that any provision of the Agreement is held by any judicial or other competent authority to be illegal, invalid or unenforceable that provision shall be severed to the extent necessary to make the Agreement enforceable, and it shall not affect or impair the validity, legality or enforceability of any of the other provisions of the Agreement.

54. No agency

54.1 No provision of this Agreement shall be construed as constituting an agency, partnership, or joint venture between the Parties and neither Party shall have any express or implied TransKarachi to bind the other Party in any way or to represent the other Party unless specifically provided to the contrary in this Agreement, and, for the avoidance of doubt, this Clause 54 shall not affect or otherwise derogate from the obligations and powers of the Operator in relation to handing over of the Vehicles to other authorised parties as contemplated in this Agreement.

54.2 The Operator is an independent contractor performing the Agreement. The Operator is not an employee or agent of TransKarachi.

55. Corruption and Fraud

55.1 The Operator warrants that in entering into the Agreement it has not committed any Prohibited Act.

55.2 In the event that the Operator is contacted by a Public Official requesting or suggesting that the Operator act in a manner which would constitute a Prohibited Act, the Operator shall immediately provide TransKarachi in writing with full details of the request (including the identity of the Public Official making the request).

55.3 Without prejudice to Clause 55.2, the Operator shall ensure that its staff undertaking activities in connection with the Agreement are subject to similar obligations to those set out in this Clause 55 and the Operator shall enforce such obligations.

55.4 In the event that the Operator fails to comply with the requirements of this Clause 55 TransKarachi shall be entitled to terminate the Agreement pursuant to Clause 38.1.

55.5 The Operator shall sign affidavit of Integrity Pact attached as Schedule [•] to Request for Proposal.

56. Entire Agreement

56.1 This Agreement constitutes the entire agreement between the Parties in relation to all matters contained herein, including all understandings, rights, responsibilities, duties and obligations and supersedes all prior arrangements, representations, communications, negotiations, agreements and contracts (whether written or oral) made between or entered into by the Parties with respect thereto prior to the Effective Date. None of the Parties shall have any claim or right of action arising from any undertaking, representation or warranty not included in this Agreement.

57. No stipulation for the benefit of a third person

57.1 Save as is expressly provided for in this Agreement, no provision of this Agreement constitutes a stipulation for the benefit of a third person which, if accepted by the person, would bind any Party in favour of that person.

58. No representations

58.1 A Party may not rely on any representation which allegedly induced that Party to enter into this Agreement, unless the representation is provided in this Agreement.

59. Amendment

59.1 Except as set out elsewhere in this Agreement, no modification, amendment, addendum or variation to the accordance with the Agreement shall be effective or binding, unless it:

  59.1.1 is made in writing; and

  59.1.2 expressly sets out the modification, amendment, addendum or variation to the accordance with the Agreement; and

  59.1.3 refers to the Agreement; and

  59.1.4 is signed and dated by a representative of each Party.

60. Indulgences

60.1 The grant of any indulgence, extension of time or relaxation of any provision by a Party under this Agreement shall not constitute a waiver of any right by the grantor or prevent or adversely affect the exercise by the grantor of any existing or future right of the grantor.

61. General co-operation

61.1 The Parties shall co-operate with each other and shall each execute and deliver to the other Party such other instruments and documents and take such other actions as may be reasonably requested from time to time in order to carry out, evidence and confirm their rights and the intended purpose of this Agreement.

61.2 Each of the Parties undertake at all times to do all such things, perform all such acts and take all such steps within its power and control, as may be necessary for and incidental to the putting into effect or maintenance of the terms, conditions and import of this Agreement and ensuring that the Services are rendered consistently at the highest possible standard expected by TransKarachi.

61.3 Each Party agrees to provide all information reasonably requested by the other in the exercise of their respective rights and performance of their obligations under this Agreement, subject to the confidentiality provisions of Clause 52 (*Confidentiality*) of this Agreement.

62. Governing law

62.1 This Agreement is to be governed, interpreted and construed in accordance with the laws of the Islamic Republic of Pakistan.

63. Language

63.1 Unless expressly notified in advance by TransKarachi, the primary language of the Agreement shall be English. All documents and communications issued between the Parties shall be in English. Unless expressly notified in advance by TransKarachi, all minutes of meetings shall be issued in English.

64. Independent advice

64.1 Each of the Parties hereby respectively agrees and acknowledges that:

64.1.1 it has been free to secure independent legal advice as to the nature and effect of each provision of this Agreement and that it has either taken such independent legal advice or has dispensed with the necessity of doing so; and

64.1.2 each provision of this Agreement (and each provision of the Annexes) is fair and reasonable in all the circumstances and is part of the overall intention of the Parties in connection with this Agreement.

65. Good faith

65.1 The Parties shall, at all times, act in good faith towards each other and shall not bring the other Party into disrepute.

66. Survival of rights, duties and obligations

66.1 The Surviving Provisions will survive termination or completion of the Agreement.

66.2 In the event that the Agreement is terminated or completed, neither Party shall be liable to the other Party except:

66.2.1 under the Surviving Provisions; or

66.2.2 in respect of any breach of the Agreement occurring before such termination or completion; or

66.2.3 any rights or liabilities between the Parties that were pre-existing as at the date of termination or completion.

67. Assignment

67.1 The Operator shall not cede, assign, delegate or transfer any of its rights or obligations under the Agreement, or any part of it, or any benefit or interest therein, to any third party or Entity without the prior written consent of TransKarachi.

67.2 Notwithstanding anything to the contrary stated in this Agreement, TransKarachi shall be entitled, without requiring the consent of the Operator, to cede, assign, delegate or transfer any rights and/or obligations under this Agreement to any third party.

68. Waiver

68.1 Subject to Clause 68.2 below, no relaxation, forbearance or delay by a Party in enforcing the Agreement will prejudice, affect or restrict the rights, responsibilities, obligations, powers or remedies of that Party nor shall any waiver by either Party of any such rights, responsibilities, obligations, powers or remedies, or of any breach of the Agreement, be deemed to be a waiver of any other right, responsibility, obligation, power or remedy, or of any later or continuing breach of, the Agreement.

68.2 Any waiver of a Party’s rights, responsibilities, obligations, power or remedies arising out of, under or in connection with the Agreement shall be in writing, dated and signed by the representative of the Party granting such waiver, and shall specify the right, responsibility, obligation, power or remedy and the extent to which it is being waived. No waiver of a breach of a term of the Agreement operates as a waiver of any other breach of that term, or of a breach of any other term, of the Agreement.

69. Costs

69.1 Any costs, including all legal costs of an attorney and own client basis and taxes, incurred by a Party arising out of or in connection with a breach by another Party shall be borne by the Party in breach.

Signed on …………………. 2019

Witnesses

....

for [TrasnKarachi]

....

duly authorised and warranting such

Name: ....

Position:______________________________

Signed on …………………. 2019

Witnesses

....

for [*BRT Company*]

....

duly authorised and warranting such [ ]

Name: ....

Position:______________________________

ANNEX A

DEFINITIONS AND INTERPRETATION

1. Definitions

1.1 In the Agreement, the following words and expressions shall have the meanings set out below:

1.1.2 "**12m Off-Corridor Kilometres (OffKm12)**" means the Bus Kilometres (excluding Scheduled Positioning Kilometres and Engineering Kilometres) travelled outside of the Corridor by 12-metre Vehicles;

1.1.3 "**12m On-Corridor Kilometres (OnKm12)**" means the Bus Kilometres (excluding Scheduled Positioning Kilometres and Engineering Kilometres) travelled on the Corridor by 12-metre Vehicles;

1.1.4 "**18m Off-Corridor Kilometres (OffKm18)**" means the Bus Kilometres (excluding Scheduled Positioning Kilometres and Engineering Kilometres) travelled outside of the Corridor by 18-metre Vehicles;

1.1.5 "**18m On-Corridor Kilometres (OnKm18)**" means the Bus Kilometres (excluding Scheduled Positioning Kilometres and Engineering Kilometres) travelled on the Corridor by 18-metre Vehicles[2];

1.1.6 "**Abandon**" means wholly or substantially cease to carry out the Services for ten (10) consecutive days or during thirty (30) days (whether consecutive or not) in any year, except when relieved of the obligation to do so by the express provisions of this Agreement;

1.1.7 "**Additional Vehicles**" means the additional Vehicles acquired in accordance with Clause 7.2 of this Agreement;

1.1.8 "**Agreement**" means this agreement as amended from time to time and including the Annexes;

1.1.9 "**Annexes**" means the annexes attached to this Agreement;

1.1.10 "**Applicable Law**" means any constitution, statute, ordinance, treaty, decree, proclamation, rules, regulations or subordinated legislation or other legislative measure, as amended from time to time, including all national and provincial statutes and legislation and all municipal by-laws, as well as the common law and customary law and any judgment, decision, order or rule of any court or tribunal with relevant jurisdiction and any decision made by judicial or administrative bodies in accordance with any of the aforegoing;

1.1.11 "**Authorised Representative(s)**" means person(s) authorised in writing by TransKarachi and the Operator respectively, as contemplated in accordance with Clause 31 (*Authorised Representative*) of this Agreement;

1.1.12 "**BRT System**" means the bus rapid transit system in Karachi included in the Project;

1.1.13 "**Bus Kilometres**" means kilometres travelled by a Vehicle on or outside the Corridor, excluding Scheduled Positioning Kilometres and Engineering Kilometres. The Bus Kilometres on Routes as determined by multiplying the number of Trips as set out in the Schedule, multiplied by the Trip Distance;

1.1.14 "**Business Day**" means any day other than a Saturday, Sunday or public holiday in Pakistan;

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[2] ***DWF comment****: TBC if the Fleet will include any other types of Vehicles (e.g., 8.5-meter Vehicles).*

1.1.15 “**Capacity**” means the maximum number of passengers that may be carried in a particular Vehicle, including all seated and standing passengers, as further defined in the Operational Specifications Schedule;

1.1.16 “**Change in Law**” means:

(a) the adoption of a new Law; or

(b) a change in or repeal of an existing Law,

which after the Effective Date results in:

(c) a change in the taxes, duties or levies payable by the Operator in respect of the Services; or

(d) a change in or the repeal of any other requirement for the performance of the Services;

1.1.17 “**Change in Ownership**” means:

(a) any sale, transfer or disposal of any legal, beneficial or equitable interest in any or all of the shares in the Operator (including the control over the exercise of voting rights conferred on those shares, control over the right to appoint or remove directors or the rights to dividends); and/or

(b) any other arrangements that have or may have or which result in the same effect as paragraph (a) above of this definition of Change in Ownership;

1.1.18 “**Charter Services**” means a charter service which involves the private hire of Vehicles and which are not Event Services;

1.1.19 “**Commencement Date**” means the date on which the Services shall commence as notified by TransKarachi by way of a Service Notice referred to in Clause 1.3.1 of this Agreement**Error! Reference source not found.**;

1.1.20 “**Conditions Precedent**” means the conditions precedent in Clause 1.3 of this Agreement;

1.1.21 “**Confidential Information**” means all information, without limitation, of whatsoever nature:

(a) relating to the Disclosing Party’s business, operations, processes, drawings, sketches, plans, models, product information, know-how, market opportunities, customers and business affairs;

(b) relating to the relationship of the Disclosing Party with its customers and suppliers; or

(c) relating to the contents of this Agreement and any other information received pursuant to this Agreement,

but excludes information which:

(d) constitutes an Operational Data; or

(e) is required to be disclosed under any law or regulation, or by any Regulatory Body, including any stock exchange on which a Receiving Party may be listed, provided that the Receiving Party in question shall first consult with the Disclosing Party before making any such disclosure, statement or announcement; or

(f) is in the public domain or enters into the public domain in any way, provided that the entry of such information into the public domain did not entail a breach of this Agreement by the Receiving Party; or

(g) the Receiving Party can show it was within its possession or knowledge, such information being in its use or having been recorded in its files, computers or other recording media, prior to receipt thereof from the Disclosing Party and which information was not previously acquired by the Receiving Party under any obligations of confidence or unlawfully; or

(h) is disclosed by the Receiving Party with the prior written approval of the Disclosing Party; or

(i) was disclosed by the Disclosing Party to a third party without restriction on disclosure or use, including without limitation, by way of a patent specification; or

(j) is hereafter disclosed or made available in good faith to the Receiving Party from a source other than the Disclosing Party, without breach by the Receiving Party of any obligation of confidentiality or non-use owed to the Disclosing Party or without breach by such other source who, to the knowledge of the Disclosing Party, is not subject to an obligation of confidentiality or non-use owed to the Disclosing Party; or

(k) is developed independently by the Receiving Party without reference to the Confidential Information;

1.1.22 [“**Corridor**” includes [•] which includes stations, roads turning points, terminals, etc.][3];

1.1.23 “**Depo**t” means the immovable properties utilised by the Operator as a depot for the Vehicles, together with such fixtures and fittings as described in the Operational Specifications Schedule, or as otherwise authorised by TransKarachi and shall, for the avoidance of doubt, include a depot provided by TransKarachi and a Staging Area, depending on the context;

1.1.24 “**Disclosing Party**” means the Party disclosing Confidential Information to the Receiving Party;

1.1.25 “**Drivers**” means those Employees who drive and operate the Vehicles;

1.1.26 “**Effective Date**” means when this Agreement has been signed by each Party, the latest of the dates upon which this Agreement was signed by any Party;

1.1.27 “**Employees**” means the employees of the Operator, or of any subcontractor contracted by the Operator to perform a part of the Service;

1.1.28 “**Encumbrance**” means:

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[3] ***DWF comment**: TBC*

(a) any mortgage, pledge, lien, assignment or cession conferring security, hypothecation, security interest, preferential right or trust arrangement or other encumbrance securing any obligation of any person or any other charge (whether equitable or otherwise) of whatsoever nature or howsoever described; or

(b) any arrangement under which money or claims to, or for the benefit of, a bank or other account may be applied, set off or made subject to a combination of accounts so as to effect discharge of any sum owed or payable to any person; or

(c) any other type of preferential agreement or arrangement (including any title transfer and retention arrangement), the effect of which is the creation of a security interest;

1.1.29 “**Engineering Kilometres**” means kilometres travelled in respect of Vehicle testing, maintenance, repairs, positioning to and from Vehicle Suppliers, training and staff transport, for which the Operator shall not be compensated;

1.1.30 “**Entity**” means any natural or juristic person, association, business, close corporation, company, concern, enterprise, firm, partnership, limited partnership, joint venture, trust, undertaking, voluntary association, body corporate and any similar entity;

1.1.31 “**EOP List**” means the list of employees allocated to be employed by the Operator under the Employment Opportunity Program led by TransKarachi annexed hereto as Annex H (to be provided at agreement stage);

1.1.32 “**Event of Force Majeure**” means an act of God or public enemy, fire, explosion, earthquake, perils of the sea, flood, storm or other adverse weather conditions, war declared or undeclared, act of terrorism, civil war, revolution, civil commotion or other civil disorder, sabotage, riot, blockade, embargo, strikes (excluding strikes by Operator Drivers or staff), lock-outs or other labour disputes, sanctions, epidemics, act of any Government, compliance with law, regulations or lawful demands of any Government or Governmental agency (provided, however, that any such event or circumstance described above shall not be treated as Event of Force Majeure to the extent that the inability to comply could have been prevented, overcome or remedied, in whole or in part, by the affected Party exercising due diligence and reasonable care);

1.1.33 “**Event Service**” means a transport service for an event, approved by TransKarachi and recorded in TransKarachi’s event calendar during the term of this Agreement;

1.1.34 “**Financially Distressed**” means that:

(a) it appears to be reasonably unlikely that the Operator will be able to pay all of its debts as they become due and payable within the immediately ensuing 6 Months; or

(b) the Operator’s liabilities exceed its assets by more than fifteen percent (15%) at any time, and

“**Financial Distress**” shall have a corresponding meaning;

1.1.35 “**Financial Year**” means, at any time, the financial year of the Operator starting on January and ending on 31 December;

1.1.36 "**Fleet**" means all Vehicles required to provide the Services as contemplated in this Agreement (and for the avoidance of doubt shall include the Initial Fleet and, if applicable, the Additional Vehicles and Replacement Vehicles);

1.1.37 "**Fund Management Agreement**" means a tripartite agreement between TPC, the System Control Service Provider and the Fund Manager whereby the Fund Manager will provide fund management services;

1.1.38 "**Fund Manager**" means a bank or other financial institution which will provide fund management services under the Fund Management Agreement;

1.1.39 "**Independent Transport Expert**" means an independent person having specialised knowledge of the matters at issue in any of the circumstances where the use of such expert is contemplated in this Agreement, to be appointed by agreement between the Parties following written request therefor by the requesting Party from the List of Transport Experts, or, failing such agreement within 48 hours of receipt of the said written request, such person selected by TransKarachi from the List of Transport Experts. The decision of the Independent Transport Expert shall be final and binding on the Parties and the costs of the Independent Transport Expert shall be borne by the Party against whom a dispute is decided, unless the Independent Transport Expert, on reasonable grounds, rules otherwise;

1.1.40 "**Initial Fleet**" means the Vehicles identified in the Operational Specifications Schedule;

1.1.41 "**Initial Maintenance Period**" means the two-year period (unless specified otherwise in the Operational Specifications Schedule) during which the Vehicle Supplier will supervise the maintenance of each Vehicle as indicated in the Vehicle Sale Agreement and/or the Operational Specifications;

1.1.42 "**Intellectual Property**" means any and all intellectual property rights of any nature anywhere in the world whether registered, registerable or otherwise, including patents, utility models, trademarks, registered designs and domain names, applications for any of the foregoing, trade or business names, goodwill, copyright and rights in the nature of copyright, design rights, rights in databases, moral rights, know-how, trade secrets and any other intellectual property rights which subsist in computer software, computer programs, websites, documents, information, techniques, business methods, drawings, logos, instruction manuals, lists and procedures and particulars of customers, marketing methods and procedures and advertising literature, including the "look and feel" of any websites;

1.1.43 "**Kilometre Charge**" means kilometre charge expressed in KPR in the Payment Calculation Schedule;

1.1.44 "**KPI(s)**" means the key performance indicator(s);

1.1.45 "**Lease-to-Own Agreement**" means the lease-to-own agreement to be concluded between TransKarachi and the Operator for the lease of the Vehicles by the Operator attached hereto as Annex E (*Lease-to-Own Agreement*);

1.1.46 “**List of Transport Experts**” means a panel of Independent Transport Experts to be agreed upon by the Parties in writing, as soon as possible after the Commencement Date. If the Parties are unable to agree the list of transport experts by the time a first request from a Party is made to refer a dispute to an Independent Transport Expert, or if there are fewer than eight independent transport experts specified on such list, then either Party may request the list of transport experts to be determined by Transport and Mass Transit Department, Government of Sindh;

1.1.47 “**Lock-in Period**” means a period of [six (6) years] commencing from the Effective Date;

1.1.48 “**Milestone**” means each step envisaged for the roll-out of the Services during the term of this Agreement as described more fully in the Operational Specifications Schedule;

1.1.49 “**Milestone 1**” means Operations of [•] units 12-meter] buses by […]

1.1.50 “**Milestone 2**” means Operations of [•] units 12-meter] buses by […]

1.1.51 “**Milestone 3**” means Operations of [•] units 18-meter] buses by […]

1.1.52 “**Minimum Annual Kilometre Distance**” means, for a given Operational Year, twenty thousand (20,000) kilometres multiplied by the number of Vehicles on the first day of that Operational Year.

1.1.53 “**Month**” or “**Monthly**” means a calendar month;

1.1.54 “**Necessary Action**” means any action that TransKarachi deem necessary and appropriate in the event that the Operator failed to take remedial action pursuant to Clause 37 (*Step-in and Necessary Action*) of this Agreement;

1.1.55 “**On-board Unit**” means any unit installed on the Vehicle by TransKarachi (or a third party appointed by TransKarachi) in accordance with the Agreement, including on-board validators, AVL/GPS units and on-board UHF/VHF radio units;

1.1.56 “**Operating Licence**” means any licence, consent or permit required by the Operator to enable it to provide the Services under this Agreement;

1.1.57 “**Operational Data**” means any operational data defined as such in the Operational Specifications Schedule or identified as “Operational Data” by TransKarachi, which shall include, among others, location of Vehicles, kilometres travelled, fares collected, and which will be available to the Operator, Other Operators and the System Control Service Provider;

1.1.58 “**Operational Specifications Schedule**” means the schedule annexed hereto as Annex B (*Operational Specifications Schedule*);

1.1.59 "**Operational Year**" means an initial operational year starting on the Commencement Date and any subsequent operational years starting on each anniversary of the Commencement Date before the Termination Date;

1.1.60 “**Other Contractors**” means collectively, the System Control Service Provider or any subcontractor of the System Control Service Provider (or any member of the consortium making up the System Control Service Provider) and any other contractors (excluding Other Operators) appointed by TransKarachi in connection with the BRT System;

1.1.61 “**Other Operator**” means any other vehicle operator appointed by TransKarachi to operate public transport services as a part of the BRT System or Service Provider of TransKarachi;

1.1.62 “**Parent Company**” means an entity (excluding any individual persons who are Employees of the Operator or are included in the EOP List):

(a) of which the Operator (or any member if the Operator is joint venture, partnership, consortium or other association of two or more entities or persons) is a branch, subsidiary or other similar related entity; or

(b) which directly or indirectly exercises management control over the Operator (or any member if the Operator is joint venture, partnership, consortium or other association of two or more entities or persons);

1.1.63 “**Parent Company Guarantee**” means the guarantee to be provided to TransKarachi by the Parent Company of the Operator pursuant to Clause 4 (*Parent Company Guarantee*) of this Agreement in the specimen form provided in Annex G (*Parent Company Guarantee*);

1.1.64 “**Party**” means a party to this Agreement;

1.1.65 “**Passenger Service Vehicle Licence**” means an Operating Licence required to be obtained by the Operator from Government of Pakistan or its Provinces for its Drivers as one of the Conditions Precedent;

1.1.66 “**Payment Calculation Schedule**” means the payment calculation schedule attached hereto as Annex C (*Payment Calculation Schedule*);

1.1.67 "**Performance Deduction Percentages**" means the amounts to be deducted from the monthly payments for the Operator pursuant to particular service level failures as set out in the Operational Specifications Schedule and in accordance with Clause 33 (*Performance Deduction Percentages*) of this Agreement.

1.1.68 “**Performance Guarantee**” means the unconditional, irrevocable on-demand performance guarantee in the specimen form attached hereto as Annex F (*Performance Guarantee*) provided to TransKarachi by the Operator pursuant to Clause 3 (*Performance Guarantee*) of this Agreement;

1.1.69 “**PKR**” means Pakistani rupee;

1.1.70 “**Prohibited Act**” means:

(a) offering, giving or agreeing to give to a Public Official a gift or consideration of any kind as an inducement or reward for:

(i) doing or not doing (or for having done or not having done) any act; or

(ii) showing or not showing (or for having shown or not shown) favour or disfavour to any person,

in relation to the award or performance of the Agreement or any other agreement with TransKarachi; or

(b) entering into an agreement for which commission has been paid or has been agreed to be paid by the Operator or on its behalf, or to its knowledge, unless before the relevant agreement is entered into, particulars of any such commission and of the terms of any such agreement for the payment thereof have been disclosed in writing to TransKarachi; or

(c) committing any offence under the Applicable Law creating offences in respect of fraudulent acts; or

(d) defrauding, attempting to defraud or conspiring to defraud TransKarachi;

1.1.71 [“**Project**” means the Karachi Bus Rapid Transit (BRT) Red Line Project carried out by TransKarachi][4];

1.1.72 “**Property Use Agreement**” means the agreement to be concluded between TransKarachi and the Operator for the use of the Depot, the Staging Area and equipment by the Operator, attached hereto as Annex D (*Property Use Agreement*);

1.1.73 “**Protocol**” means a protocol and/or a standard operating procedure issued from time to time by TransKarachi indicating how, among other things, Services are to be rendered, the manner in which the Operator and Other Operators should work together, the exact procedures to be followed in order to comply with service level requirements set out in the Operational Specifications Schedule and any other ancillary matters;

1.1.74 “**Public Official**” means an official or employee of a government owned or controlled enterprise or any Regulatory Body and shall include any individual defined as a public official in an Applicable Law;

1.1.75 “**Quarter**” or “**Quarterly**” means a consecutive period of three (3) Months commencing from the start of a Financial Year or calendar year, as the case may be;

1.1.76 “**Receiving Party**” means the Party receiving Confidential Information from the Disclosing Party;

1.1.77 “**Regulatory Body**” means any governmental, semi-governmental, administrative, fiscal or judicial ministry, department, commission, authority, tribunal, agency, municipality or body, and shall include the provider of electricity, gas, water, wastewater, telecoms and other such public services, and any body with a regulatory function under the Applicable Law;

1.1.78 “**Remaining Vehicles**” means any remaining balance of the Initial Fleet still to be delivered to the Operator in accordance with the provisions of this Agreement as well as any Additional Vehicles or Replacement Vehicles purchased by TransKarachi;

1.1.79 “**Replacement Vehicle**” means a Vehicle acquired in accordance with the provisions of Clause 7.2 of this Agreement;

1.1.80 “**Reserve Fund**” means the fund to be established as a security in accordance with Clause 27 (*Reserve Fund*) of this Agreement;

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[4] ***DWF comment**: TBC*

1.1.81 “**Restricted Companies**” means Other Operators and/or Other Contractors;

1.1.82 “**Restricted Share Transfer**” means the transfer of shares or any interest in shares of the Ownership outside the Lock-in Period that may result in the Change of Ownership;

1.1.83 “**Routes**” means the routes for each of the Services set out in the Operational Specifications Schedule (and includes start point, end point and specific path), as may be amended by TransKarachi by way of delivery of a Service Notice to the Operator in accordance with the terms and conditions of this Agreement;

1.1.84 “**Schedule**” means the schedule of Trips to be issued to the Operator prior to the Commencement Date and as amended from time to time by way of a Service Notice or instructions from TransKarachi;

1.1.85 “**Scheduled Kilometres**” means collectively, the Scheduled Kilometres on Routes as determined by multiplying the number of Trips as set out in the Schedule, multiplied by the Trip Distance;

1.1.86 “**Scheduled Positioning Kilometres**” means kilometres:

(a) from the gate/entry point of Depot/Staging Area to the starting point of a scheduled Trip; or

(b) from the end of a scheduled Trip to the gate/entry point of Depot/Staging Area; or

(c) from the end of a scheduled Trip to the starting point of the next scheduled Trip along the shortest route;

(d) as determined by TransKarachi, but shall exclude Engineering Kilometres;

1.1.87 “**Service**” or “**Services**” means the public transport services to convey passengers, including Event Services and Charter Services and any other services to be rendered by the Operator on the terms and conditions of this Agreement;

1.1.88 “**Service Delivery Plan**” means a plan to be submitted by the Operator to TransKarachi pursuant to Clause 10.1 of this Agreement;

1.1.89 “**Service Notice**” means a notice given to the Operator by TransKarachi in accordance with this Agreement;

1.1.90 “**Staging Area**” means the staging area used by the Operator in the provision of the Services as described in the Operational Specifications Schedule, or as otherwise authorised by TransKarachi for temporary parking of Vehicles in day and/or night time;

1.1.91 “**Stations**” means the stations described in the Operational Specifications Schedule, and which are intended as passenger embarkation and disembarkation points and Station means any one of them;

1.1.92 “**Stops**” means places along the off-Corridor Routes at which Vehicles are to come to a stop in order for passengers to embark or disembark from the Vehicles, as specified by TransKarachi, but excluding Stations;

1.1.93 “**Surviving Provisions**” means Clauses 1 (Preliminary Matters), 38 (*Breach and Termination*), 39 (*Dispute resolution*), 43 (*Intellectual Property*), 49 - 69 (*Part J - Final Provisions*) and this Annex A (*Definitions and Interpretation*);

1.1.94 “**System Control Service Provider Agreement**” means the agreement entered or to be entered into between TransKarachi and the System Control Service Provider which shall regulate, among other things, the maintenance of an automatic fare collection system, as well as management, maintenance and control of the Stations;

1.1.95 “**System Control Service Provider**” means the contractor who shall be responsible for designing, implementing, maintaining and operating the equipment on the Vehicles and at the Stations, as well as management, maintenance and control of the Stations in accordance with the System Control Service Provider Agreement;

1.1.96 “**Termination Date**” means the [twelfth (12th) anniversary] of the Commencement Date or the date on which an earlier termination pursuant to the terms of the Agreement takes effect;

1.1.97 “**Trip**” means the journey undertaken by Vehicles in accordance with the Schedule and includes a journey in respect of Scheduled Positioning Kilometres except where expressly excluded or the context implies such exclusion;

1.1.98 “**Trip Distance**” means the kilometres of each Trip determined as follows:

(a) firstly, as surveyed by TransKarachi or through a third party engaged by TransKarachi (and which for the avoidance of doubt shall exclude Scheduled Positioning Kilometres); or

(b) to the extent that the above survey has not been carried out, then the kilometres specified in the Operational Specifications Schedule or as otherwise agreed between the Parties,

provided that in the event of a dispute between the Parties in relation to the determination of the kilometres of any Trip, either Party shall be entitled to refer such dispute to the Independent Transport Expert for final determination;

1.1.99 “**Uniform**” means the uniform to be worn by those Employees of the Operator required to fulfil their duties in view of members of the public, as prescribed in the Operational Specifications Schedule and includes the name tag issued to each Employee by Operator;

1.1.100 “**Vehicle Delivery Date**” means a date not less than one (1) Month prior to the “projected start-date of roll-out” of each Milestone as specified in clause 1.1.48 on which the Operator takes delivery of the Vehicles, or such other date as may be agreed between the Parties;

1.1.101 “**Vehicle Dispatch Plan**” means a plan of dispatching the Vehicles to be provided by the Operator to TransKarachi pursuant to Clause 10.1 of this Agreement;

1.1.102 “**Vehicle Sale Agreement**” means the agreement of sale and/or supply entered into, or to be entered into, between TransKarachi, on the one hand, and a Vehicle Supplier, on the other hand, in relation to Vehicles;

1.1.103 “**Vehicle Supplier**” means such entity which sells or otherwise supplies Vehicles to TransKarachi in accordance with a Vehicle Sale Agreement;

1.1.104 “**Vehicles**” means the vehicles purchased by TransKarachi in accordance with the Vehicle Sale Agreement(s), to be made available to the Operator, for purposes of rendering the Services and specified in the Operational Specifications Schedule and shall include the Additional Vehicles and Replacement Vehicles, as the case may be;

1.1.105 “**VOC Dispatch Schedule and Headway Targets**” means a schedule provided by TransKarachi to the Operator in accordance with Clause 10.1 of this Agreement which shall be based on the Master Dispatch Schedule and Headway Targets referred to in the Operational Specifications Schedule;

1.1.106 “**Warranty**” means the warranties and undertakings given to TransKarachi by the Operator, set out in Clause 34 (*Warranties, Undertakings and Indemnities) of this Agreement;*

1.1.107 “**Week**” or “**Weekly**” means the period commencing at 00h00 on Monday and ending at 24h00 on Sunday each calendar week.

2. Interpretation

2.1 In the Agreement:

2.1.1 in the event of conflict between the Annexes and the provisions of this Agreement (excluding the Annexes), the provisions of the Agreement shall prevail;

2.1.2 any definition in this Agreement, shall bear the same meaning and apply throughout this Agreement including Annexes hereto, unless otherwise stated or inconsistent with the context in which it appears;

2.1.3 the singular includes the plural and vice versa;

2.1.4 a reference to a statutory provision includes any subordinate legislation made from time to time under that provision and includes those provisions as amended, consolidated, re-enacted or replaced from time to time;

2.1.5 a reference to a document includes the document as modified from time to time and any document replacing it, in each case in the manner permitted by the Agreement;

2.1.6 a reference to a gender includes the other genders;

2.1.7 a reference to any government agency or body, if that agency or body ceases to exist or is reconstituted, renamed or replaced or has its powers or functions removed (“defunct body”), means the agency or body that performs most closely the functions of the defunct body;

2.1.8 a reference to an “agent” shall mean any person with a contractual relationship with a Party and carrying out activities or obligations on behalf of that Party;

2.1.9 a reference to a “subsidiary” shall be a reference to a subsidiary as defined in the Companies Act, 2017;

2.1.10 references in this Agreement to “clauses” or to “Annexes”, are to clauses of and Annexes to this Agreement;

2.1.11 references to notices or requests made or received by any of the Parties shall, unless expressly provided otherwise in this Agreement, refer to notices or requests in writing;

2.1.12 references to “agree” or “agreed” shall require the agreement to be recorded in writing and signed by the authorised representatives of the Parties;

2.1.13 no rule of construction shall be applied to the disadvantage of a Party to this Agreement because that Party was responsible for or participated in the preparation of this Agreement or any part of it;

2.1.14 unless otherwise provided, any number of days prescribed shall be determined by excluding the first and including the last day or, where the last day falls on a day that is not a Business Day, the next succeeding Business Day;

2.1.15 references to day/s, month/s or year/s shall be construed as Gregorian calendar day/s, month/s or year/s, as the case may be;

2.1.16 if a definition imposes substantive rights and obligations on a Party, such rights and obligations shall be given effect to and shall be enforceable, notwithstanding that they are contained in a definition;

2.1.17 a reference to a Party includes that Party’s successors and permitted assigns;

2.1.18 the use of the word “including” followed by a specific example/s shall not be construed as limiting the meaning of the general wording preceding it and it shall be construed as if it were followed by “without being limited to”.

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 2.5 - DRAFT CONTRACTS

OPERATOR CONTRACTS – ANNEX B

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

Annex B

Operational Specifications Schedule

1. OPERATOR RESPONSIBILITIES

1.1 General

1.1.1 The Operator shall allocate a unique identifying fleet number to each Vehicle which is to be displayed at all times. The Operator shall provide TransKarachi with an initial set of display decals for the Vehicles and the Operator shall replace such display decals when necessary as directed by TransKarachi from time to time.

1.1.2 The Operator shall ensure that all Vehicles are in satisfactory operational condition (fair wear and tear excluded) so that they conform to the operational standards of a first class bus rapid transit system. This means, in particular, that all Vehicles should be clean and tidy, well-maintained, driveable and meeting all health and safety requirements.

1.1.3 TransKarachi shall be entitled to conduct random inspections of any Vehicle.

1.1.4 TransKarachi shall be entitled to prohibit the use of a particular Vehicle should any inspection reveal any defects and/or health and safety issues which renders the Vehicle unsuitable for use on the BRT System. The prohibition of use of any Vehicle shall not in any way release the Operator from any of its obligations pursuant to the Agreement. The Operator shall be fully responsible for the Vehicles allocated to it, while in its possession.

1.2 Drivers

1.2.1 The Operator shall, by no later than ten (10) Days after the Commencement Date and/or the appointment of a Driver, furnish to TransKarachi in respect of each Driver, copies of:

(a) an appropriate valid driver’s licence (PSV License).

1.2.2 The Operator shall deliver to TransKarachi a list of Drivers (in the form satisfactory to TransKarachi) by not later than two (2) Business Days after the Commencement Date, which list shall be updated on a Monthly basis for the duration of the Agreement and which may be provided to TransKarachi by way of an exception report indicating the incoming and exiting Drivers.

1.2.3 Where TransKarachi has reason to believe that a Driver poses a risk to the safety of passengers, or where a member of the public requests TransKarachi to investigate the conduct of a particular Employee of the Operator, TransKarachi shall notify the Operator in writing accordingly (setting out the reasons for its belief, where applicable), and the Operator shall be obliged to take all such steps as may be necessary, including, where appropriate, conducting an immediate investigation into the allegations and if appropriate, effecting the suspension of such Driver/Employee pending the finalisation of appropriate disciplinary action. The Operator shall report on the investigation to TransKarachi and if any disciplinary enquiry is instituted, the Operator shall report the outcome thereof to TransKarachi immediately upon such enquiry being completed.

1.3 Training of the Drivers

1.3.1 The Operator shall ensure that by the Commencement Date sufficient Drivers are required to provide the Services have attended and completed any training sessions as may be held by the Vehicle Supplier (and/or TransKarachi) and that such Drivers have obtained the relevant driver's licences and having reached the necessary proficiency to operate the Vehicles.

1.3.2 The Vehicle Supplier shall provide a total of 200 hours (four (4) hours per day for ten (10) weeks) of training including both classroom and road testing. Drivers should be available for training of four hours per day, five days per week during a period of ten (10) weeks.

1.3.3 In addition to above, the Vehicle Supplier will provide a separate "Train the Trainers" program for a smaller group of three (3) persons selected from the larger group of trainees. This training program shall enable the Operator to be able to directly train new drivers in the future. The "Train the Trainers" program shall involve at least forty (40) hours of instruction in addition to the driver training program. The "Train the Trainers" program shall take place during and after the driver training program.

1.3.4 TransKarachi shall be entitled to perform regular spot checks and examinations in order to ensure that the skill levels of Drivers are maintained in accordance with TransKarachi's requirements

1.3.5 The Operator shall also, at its own cost, ensure that Drivers or other appropriate Operator's personnel are trained properly to operate Public Service Vehicles. The training shall include understanding Operational SOP, Scheduling, Fare Collection, ITS and communication equipment operation and other requirements of BRT System.

1.4 Uniforms

1.4.1 TransKarachi requires all Employees who are required to fulfil their duties in view of the public to wear Uniforms at all relevant times during the rendering of the Services. The Operator shall ensure that its Employees are appropriately attired in the prescribed and/or agreed Uniforms.

1.4.2 It is agreed that the Uniforms provided by the Operator shall comply with the specification and/or design provided by TransKarachi from time to time. TransKarachi shall consult with the Operator before amending the specification and design of the Uniforms.

1.4.3 The Operator shall take such reasonable steps as may be necessary to ensure that the Uniforms are kept in good condition and worn in a professional manner and in accordance with the high standards required by TransKarachi in relation to the branding.

1.5 Public relations

1.5.1 In order to ensure that the Services are rendered in a seamless manner and that the Services as experienced by members of the public are consistent with TransKarachi's expectation of a high-quality bus rapid transit system and are regarded as such by the general public, the Operator shall ensure that Employees:

(a) communicate with passengers and members of the public in a customer-friendly, professional and helpful manner;

(b) conduct themselves as if they were TransKarachi staff and at all times, behave in a manner befitting TransKarachi's image and brand;

(c) refrain from conduct which may bring TransKarachi and the BRT System into disrepute; and

(d) deal with customer complaints in a responsive and courteous manner.

1.5.2 In complying with Clause 1.5.1 above, the Operator shall ensure that all Employees receive appropriate training in the following areas:

(a) service requirements of passengers with disabilities;

(b) management of confrontational or difficult passengers;

(c) occupational health and safety issues;

(d) customer care and customer relations;

(e) the role of a Driver;

(f) inspection, dispatch and supervision of services;

(g) compilation of claims;

(h) passenger safety, which shall include, amongst other things, procedures pertaining to safe embarking and disembarking of passengers and ensuring that Vehicle doors are closed only when it is safe to do so.

1.5.3 Should the Operator become aware of an Employee that is not fit and proper to execute his/her duties effectively, the Operator shall take appropriate action immediately.

1.6 Passengers

1.6.1 For the duration of the Agreement and subject always to Protocols issued by TransKarachi from time to time the Operator shall be obliged to:

(a) collect and hand over any lost property to the System Control Service Provider;

(b) display any information provided to it by TransKarachi for display on Vehicles or flags on special events;

(c) ensure that Employees are able to inform customers regarding timetables, Routes, fares, basic way-finding information and other transport services;

(d) remedy any damage and/or mistakes regarding any signage on the Vehicles; and

(e) respond to any complaints forwarded to it by TransKarachi within three (3) Days through Complaint Route Management System or directly.

1.6.2 The Operator shall ensure that up-to-date timetables and fare tables are displayed at all times on Vehicles.

1.6.3 The Operator shall be responsible for operation and maintenance of the air conditioning system in the Vehicles in order to ensure that during operations average interior temperature is between 23°C and 25°C when the outside ambient temperature is higher than 25°C. The air conditioning system shall be capable of reaching the targeted interior temperature of between 23°C and 25°C within thirty (30) minutes of vehicle operation when the ambient temperature is up to 45°C. The system shall continue to provide a cooling function until a cut-off temperature of 50°C. The temperature transmitted through Vehicle Logic Unit will be used for verification.

1.7 Capacity

1.7.1 The provisional number of passengers that may be carried in a particular Vehicle, including all seated and standing passengers, is [75] for [12-metre] Vehicle and [125] for [18-metre] Vehicle. Those numbers of passengers may from time to time be changed by TransKarachi to meet and/or optimize the requirements of TransKarachi and the BRT System.

1.8 Image, Marketing and Advertising

1.8.1 The Operator shall comply with instructions from TransKarachi from time to time regarding branding in terms of the use of graphics, information, signage, information, advertising and Vehicle livery and will co-operate with and participate in agreed marketing programmes as directed by TransKarachi.

1.8.2 Subject to Clause 1.8.3 and Clause 1.8.4, the Operator shall be permitted to affix or display advertising material in dedicated areas on the interior of the Vehicles and generate revenues out of such advertising activity.

1.8.3 The content of any advertising affixed or displayed by the Operator shall be approved by TransKarachi prior to such being affixed and/or displayed anywhere within any Vehicle. Upon TransKarachi's request, the Operator shall immediately provide TransKarachi with all documents, information and materials related to any advertising activity, including any agreements made by the Operator with third parties for carrying out such advertising activity. If TransKarachi objects to any of the details notified by the Operator, such objection shall be recorded in writing and TransKarachi and the Operator shall endeavour in good faith to resolve the issues giving rise to such objection. In the event of a failure to reach a resolution, TransKarachi's position on the issue shall prevail.

1.8.4 The Operator shall ensure that any advertising material on the interior of the Vehicles is not deceitful, pornographic, provocative, terrorising or violent, that it is befitting TransKarachi's image and brand and that it otherwise conforms to the Applicable Law.

1.8.5 The Operator shall not be permitted to affix or display advertising material of any kind on the Depot, Staging Area, Stations or Stops or allow or permit same to be affixed or displayed without the prior written approval from TransKarachi.

1.9 Access control

1.9.1 The System Control Service Provider shall be primarily responsible for access control and to monitor fare evasion on Vehicles.

1.9.2 In the event a Driver or Employee notices a breach of access control or fare evasion on a Vehicle, such Driver or Employee shall report the incident to the System Control Service Provider's staff as soon as practicable and provide the System Control Service Provider's staff with details of the offending passenger as well as report incident to TransKarachi immediately.

1.9.3 Should a passenger breach access control measures and board a Vehicle and should such Vehicle depart before corrective action is taken, the System Control Service Provider is obliged to alert the relevant Driver of such incident. To the extent possible, the Operator shall ensure that the Driver uses all reasonable endeavours to identify the offending passenger and inform the System Control Service Provider's staff of the incident at the following Station or Stop or Control Centre via VHF/UHF system.

1.10 Service Delivery Plan

1.10.1 The Service Delivery Plan to be provided by the Operator should, at the minimum, include the following details of the Operator's plans for rendering the Services:

(a) all activities of the Operator to ensure that the Services operate in accordance with the VOC Dispatch Schedule and Headway Targets;

(b) works and processes to be implemented by the Operator in order to ensure its compliance with all labour, employment, occupational health and safety regulations and standards applicable to the Services;

(c) the organisation of the planned maintenance processes and activities (including the contractual relationships and the risk allocation between contracting partners);

(d) the planned maintenance processes and the location at which the maintenance will take place;

(e) all planned maintenance activities inclusive of its proposed frequency;

(f) the organisation of the unplanned maintenance processes and activities;

(g) the unplanned maintenance processes and the location at which the maintenance will take place;

(h) quality management processes to assure the quality level of all maintenance activities (including KPIs, test procedures, audits, frequency, etc.);

(i) all activities of the Operator to ensure safe disposal or recycling of any oil, lubricant or water containing any variation of such lubricant in accordance with the Applicable Law;

1.11 Depot and Staging Area

1.11.1 [[•] depot will be used by the Operator to meet operational requirements of BRT System.]

1.11.2 TransKarachi will grant non-exclusive license for use of depot to the Operator on Terms and Conditions defined in Property Use Agreement and fitted with required facilities such as Workshop, room for maintenance/storage, Charging Facility, Parking Spaces, Admin block, wash rooms etc. Initially, due to late start of Construction of depot, the operator may require to do temporary arrangements at depot, at its own cost, to facilitate operations & protection of buses.

1.11.3 Unless expressly stated otherwise, the Operator shall, at its own cost, be responsible for all the operation and maintenance of the Depot and the Staging Area, including but not limited to:

(a) the Depot and the Staging Area security;

(b) access control of staff and Vehicles to the Depot and/or the Staging Area;

(c) the Depot and Staging Area maintenance and cleaning, including all signage and facilities (bus washing, bus fuelling, bus maintenance);

(d) parking Vehicles when not used only inside the Depot and/or Staging Area,

(e) maintenance of landscaping inside Depot, Staging Area

as further described in the Property Use Agreement.

1.11.4 TransKarachi shall provide electricity and water connection inside the Depot. The Operator shall be responsible for all costs associated with the consumption of such utilities as further described in the Property Use Agreement.

1.12 Stations and Stops

1.12.1 An indicative map showing the Stations and Stops is attached as Schedule 5 to this Operational Specifications Schedule. The alignment of off-corridor routes, location of Stations, terminals and Stops, may from time to time, be changed by TransKarachi to meet and/or optimize the requirements of TransKarachi and the BRT System.

1.13 Initial Fleet

1.13.1 The Initial Fleet shall consist of [[•] 12-meter Vehicles and [•] 18-meter Vehicles manufactured by [•] (**Technical Specifications are attached as Schedule 6**). The Functional Specifications are also attached as Schedule 6, however, these Functional Specifications are descriptive and not restrictive in nature and deviations by TransKarachi from these specifications shall not be considered as violation of the Agreement. These Technical and Functional Specifications shall further by verified jointly by TransKarachi and Operator at the time of take-over of Vehicles.

1.13.2 The Vehicle Supplier (on behalf of TransKarachi) provide warranty on the chassis, body, and all vehicle components to protect against any defects in design, workmanship, equipment, or materials. With the exception of the electric storage and propulsion system (i.e. battery packs and electric motors), the warranty for all other parts and components will commence from the date of delivery of the Vehicle for approximately two years. For the battery packs and electric motors, the Supplier will provide all necessary replacements for [twelve (12) years or one million two hundred thousand (1,200,000) kilometres] of service, whichever of these two milestones are realized first. The battery packs shall be replaced under this warranty whenever the battery capacity falls below seventy percent (70%) of its original capacity at full charge. The warranty stipulate that the Supplier is responsible for all repair and replacement costs due to the premature failure of any part or component due to defects in design, workmanship, equipment, or materials. The warranty will not cover any costs associated repairs or replacements due to the actions of the BRT Vehicle Operators. Among the types of repairs or replacements not covered under the warranty are road collisions or other unscheduled incidents.

1.14 Maintenance of the Vehicles

1.14.1 Initial Maintenance Period

(a) The Initial Maintenance Period shall run for two (2) years of the delivery of each Vehicle from the Initial Fleet as confirmed in the Vehicle delivery and acceptance protocol signed by the Vehicle Supplier and TransKarachi.

(b) During the Initial Maintenance Period the Vehicle Supplier will supervise maintenance of Vehicles at its own cost. However, it is the Operator who shall, at all times during the term of the Agreement, including the Initial Maintenance Period, remain responsible for maintenance and repairs of all Vehicles in accordance with the Vehicle Supplier requirements, and/or recommendations and the provisions of the Agreement to maintain Technical and Functional Specification of Vehicles. The cost of maintenance and repairs of the Vehicles shall be borne by the Operator.

1.14.2 Maintenance staff training

(a) The Operator is required to provide suitably qualified staff to maintain all the Vehicles ("**Maintenance Staff**") during the term of the Agreement, including the Initial Maintenance Period.

(b) The costs of the Maintenance Staff shall be borne by the Operator.

(c) The Maintenance Staff shall be trained by the Vehicle Supplier in two phases: the initial and the final one.

(d) The initial training program will take place at intervals over at least three hundred twenty (320) hours of actual training sessions. These sessions will include both classroom instruction as well as hands on repair work in the Depot maintenance area. Approximately twenty-four (24) persons of the Maintenance Staff will be trained.

(e) The final training will specifically address future maintenance issues to be faced by the Operator. In particular, this final training will focus on any potential engine rebuild work or battery pack replacement work that would be required. This second set of training sessions should cover at least forty (40) hours of training. Approximately twenty-four (24) of the Maintenance Staff will be trained.

(f) In addition, the Vehicle Supplier will provide a "Train the Trainers" program for smaller group of two (2) persons selected from the larger group of trainees. This training program shall enable the

Operator to directly train the new maintenance staff in the future. This “Train the Trainers” program shall at minimum involve forty (40) hours of instruction in addition to the maintenance training.

(g) Where training is provided by or on behalf of the Vehicle Supplier at the cost of TransKarachi, the Operator shall be responsible for any salary, wage or stipend payable to trainees, protective clothing and any personal tools required as well as all other costs associated with sending the trainee for the training course. Where a trainee fails to complete a course, the Operator will be required to train an alternative trainee or to employ qualified Maintenance Staff at its own cost.

1.14.3 Detailed maintenance obligations

The Operator’s maintenance and repair obligations shall include, but not be limited to:

(a) repair and/or replacement of tyres and/or wheels subject to accident damage, excessive wear and tear and uneven wear and the Operator shall at all times adhere to the tyre specifications as determined by TransKarachi from time to time;

(b) supply and top-up of lubricants;

(c) supply of fuel, electricity and fuel additives;

(d) any repair or replacement required, necessitated or caused as a result of, or generally resulting from, or in connection with, the following:

  (i) accidental or intentional damage;

  (ii) labour disturbances attributed to the Operator’s Employees;

  (iii) improper or negligent use of the Vehicles;

  (iv) use of the Vehicles in breach of the terms and conditions of the Agreement;

  (v) incompetence of the Operator or the Employees, subcontractors or any third party in driving, handling, working, or otherwise dealing with the Vehicles;

  (vi) servicing, maintenance or repairs to the Vehicles by any third party other than in accordance with the directions of a Vehicle Supplier or with the prior written approval of a Vehicle Supplier during the Initial Maintenance Period;

  (vii) minor repairs strictly necessary and carried out in an emergency situation or breakdown;

(viii) shock loading conditions and/or adverse driving conditions (and including, but without limitation, the exceeding of legally permitted gross vehicle and/or gross combination mass (provided that the Vehicle is equipped with the technology to inform the Driver when such mass is exceeded), speed limits and/or RPM (revolutions per minute);

(ix) the theft of the Vehicles;

(x) failure to comply with the manuals applicable to Vehicles, provided that the manuals have been furnished to the Operator;

(xi) failure or malfunction of any component or equipment which is not provided by a Vehicle Supplier or its subcontractors installed on the Vehicles, as approved by a Vehicle Supplier in circumstances where such component or equipment ought to have been provided (or approved) by a Vehicle Supplier or a subcontractor, as the case may be;

(xii) the use of contaminated or non-Vehicle Supplier approved fuels, additives and/or lubricants;

(xiii) the repair or replacement, as the case may be, of or to the paintwork, chrome, trims (including but without limitation, carpets, seats, railings and handles), emblems, body work, upholstery, cab structure, windscreen, mud flaps, windows and glass generally, bulbs, the repair of any road and stone damage to the paintwork;

(xiv) attending to breakdowns and generally delivery to or collection or transportation from the point of service, salvage or breakdown (other than as set out above or below);

(xv) jump-starting the Vehicles;

(xvi) work done outside operating hours, regarding attendance to breakdowns and regarding emergency repairs;

(xvii) non-compliance by the Operator with any other obligations under the maintenance provisions specified in the Agreement and the relevant Vehicle Maintenance Agreement;

(xviii) theft of the Vehicle equipment and components;

(xix) tampering with the Vehicle odometer, controls and any other specialised vehicle equipment;

(xx) operating the Vehicles in a manner that may harm the Vehicles' electrical and driveline components;

(xxi) the Vehicle component damage due to the Operator's negligence in checking and maintaining oil, lubricant and fluid levels as stipulated in the applicable Vehicle Supplier operating manual;

(xxii) operation of the Vehicle on Routes and road surfaces for which the Vehicle was not designed unless specifically authorised by TransKarachi.

In addition, the Operator shall, among other things:

(a) perform the required regular checks, in accordance with the manuals (which shall be furnished to the Operator) and including the checking of coolant levels, lubricant levels, tyre pressure and the like and the introduction of anti-freeze or the application of rust inhibiting agents;

(b) replace lost parts including, but not limited to, spare wheels, fire extinguishers, first-aid kits, warning triangles and lamps, tools, jack, service booklets and the like and perform any testing or maintenance of such items;

(c) wash the Vehicles on a daily basis (save for a complete wash of the chassis, engine, gearbox, front and rear axle, at the time of carrying out routine service and maintenance work where this is undertaken by the Vehicle Supplier) and clean the interior of the Vehicles whenever they are departing from the Depot;

(d) attend to the fitment, service or repair of any parts or equipment necessary pursuant to any Applicable Law which may come into force after the Signature Date;

(e) carry out maintenance and repairs of the Vehicles in accordance with industry best practice to maintain Technical Specifications and meet Functional Specifications;

(f) carry out brake testing every five thousand (5,000) kilometres as required by Applicable Law, if different;

(g) keep and use the Vehicles in a proper and prudent manner and ensure that only duly qualified and competent persons are allowed to drive the Vehicles and amongst other things, but without limitation, ensure that the Vehicles are not operated improperly or negligently;

(h) ensure that the Vehicle Supplier's running-in instructions and proper responses to systems warnings are fully understood and properly observed;

(i) ensure that legally permitted gross vehicle and/or gross combination mass is not exceeded during operation which was agreed at take-over time;

(j) not overload the Vehicles nor use it for any purpose for which it is not designed;

(k) ensure that no components of the Vehicles are removed or exchanged except where defective and in the course of normal service, repair or replacement and generally ensure that the Vehicles are operated in a complete condition;

(l) ensure that regular checks are made by the Operator of all oils, coolants, additives and electrolyte levels and that such levels are correctly maintained in accordance with the manuals;

(m) take all reasonable steps and precautions to minimise damage to the Vehicles and in particular, but without limitation, in the event of any defect or failure occurring in the Vehicles;

(n) service the Vehicle at the relevant intervals in accordance with the relevant Vehicles' manuals and TransKarachi's instructions;

(o) promptly repair the Vehicles in accordance with the relevant Vehicles' manuals and TransKarachi's instructions;

(p) allow authorised Vehicle Supplier representatives access to the Vehicles and for this purpose ensure that such representatives are permitted to enter into the relevant Depot or Staging Area for this purpose, for the duration of the Initial Maintenance Period;

(q) co-operate at all times with the Vehicle Supplier in respect of the Vehicle Supplier's supervision obligations, for the duration of the Initial Maintenance Period;

(r) ensure that only fuel and additives as prescribed by the Vehicle Supplier are used;

(s) in the event that the Operator proposes to use any alternative to the additive as prescribed by the Vehicle Supplier, first obtain authorisation from TransKarachi and reasonable conditions may be imposed;

(t) cause the Vehicles to be used only for their specified use;

(u) be responsible for maintenance and repair of all subsystems and equipment in Vehicles and recoup any missing or theft items;

(v) allow TransKarachi's Authorised Representative to inspect the Vehicles, have access to and be entitled to, download, all information available from the Vehicles (whether from onboard computers or otherwise) including the kilometres travelled by the Vehicles;

(w) be responsible for all daily pre-Trip checks prior to the Vehicles leaving the Depots, including necessary functionality checks in relation to the On-board Units.

1.15 Operating and control procedures

1.15.1 The System Control Service Provider is responsible for agreeing with TransKarachi the Master Dispatch Schedule and Headway Targets. TransKarachi will be responsible to assign the Routes for the Operator.

1.15.2 The Operator shall carry out the Services in accordance with the instructions issued by TransKarachi (whether directly or indirectly through the System Control Service Provider) and in accordance with the VOC Dispatch Schedule and Headway Targets issued by the System Control Service Provider from time to time.

1.15.3 Unless a longer time is consented to in writing, the Operator shall within three (3) days of receipt of the VOC Dispatch Schedule and Headway Targets, prepare and submit for the System Control Service Provider’s approval a Vehicle Dispatch Plan which details the dispatch of specific vehicles and vehicle personnel for each trip (in accordance with the VOC Dispatch Schedule and Headway Targets).

1.15.4 Unless otherwise instructed by TransKarachi and except for public holidays the regular hours for the passenger services shall be from 6:00 hours to 22:00 hours each day (“**Operations Hours**”).

1.15.5 TransKarachi may at any time serve a notice to the System Control Service Provider outlining its requirements for change of the Master Dispatch Schedule and Headway Targets (“**Master Dispatch Schedule and Headway Targets Change**”), for example, specifying the number of services that are to be added to, or removed from, any Route by time band, the approximate times at which any services are to be added or removed or the changes to the passenger services to be made as a result of a Route adjustment. In circumstances described in the System Control Service Provider Agreement the Master Dispatch Schedule and Headway Targets Change may be also proposed by the System Control Service Provider.

1.15.6 The Operator is required to comment on the Master Dispatch Schedule and Headway Targets Change by the deadline specified by TransKarachi. In its comments the Operator shall identify if the Master Dispatch Schedule and Headway Targets Change would have any impact on the Operator, its Services, or KPIs. In particular, the Operator shall identify if, notwithstanding the use of all prudent commercial endeavours, it would be unable to meet the amended timetabled journey times.

1.15.7 TransKarachi shall amend the Master Dispatch Schedule and Headway Targets to incorporate that Master Dispatch Schedule and Headway Targets Change, and submit a final electronic and hard copy version of the revised Master Dispatch Schedule and Headway Targets to the System Control Service Provider no later than fifteen (15) days prior to the date the change of the Master Dispatch Schedule and Headway Targets is to take effect.

1.15.8 The System Control Service Provider will be responsible for preparation of the VOC Dispatch Schedule and Headway Targets based upon the Master Dispatch Schedule and Headway Targets. Within seven (7) days of the Master Dispatch Schedule and Headway Targets or a revised Master Dispatch Schedule and Headway Targets being submitted to the System Control Service Provider by TransKarachi, the System Control Service Provider will submit the VOC Dispatch Schedule and Headway Targets matching the requirements of the Master Dispatch Schedule and Headway Targets.

1.15.9 The scheduling of which of the Vehicles shall correspond to the Master Dispatch Schedule and Headway Targets and shall be the responsibility of the System Control Service Provider but the System Control Service Provider shall use commercial endeavours to maintain that each Vehicle at the end of each Month shall have travelled a similar number of kilometres.

1.15.10 The System Control Service Provider may change the VOC Dispatch Schedule and Headway Targets and submit revised VOC Dispatch Schedule and Headway Targets from time to time, provided any change is notified at least fourteen (14) days before its coming into effect and provided the revised VOC Dispatch Schedule and Headway Targets still matches the requirements of the Master Dispatch Schedule and Headway Targets.

1.15.11 With respect to the controlling, the System Control Service Provider will keep track of the performance of the Fleet vis-à-vis the VOC Dispatch Schedule and Headway Targets, give instructions to Drivers to optimize operations; instruct the dispatchers to inform the passengers and shall optimally respond to incidents that negatively affect the operations. The System Control Service Provider will take all relevant inputs to optimize controlling the BRT System. This includes messages from the Drivers, from CCTV surveillance personnel and from the Station personnel.

1.16 Monthly Operations Reports

1.16.1 No later than 17:00 pm on the 3rd (third) Business Day of each month, starting on the last Business Day of the first calendar month after the Commencement Date, the Operator shall submit to TransKarachi a report on the performance of its obligations under the Agreement during the previous month (“**Monthly Operations Report**”), covering at a minimum:

(a) road safety performance, including full details on any Severe Accident, Material Accident, Minor Accident, emergency or traffic offence;

(b) punctuality performance, including full details on percentage of Untimely Departures, Actual Headway Time and Excess Headway Time;

(c) Fleet performance, including full details on any Severe Vehicle Defect maintenance operations on the Vehicles;

(d) other indicator as agreed between the Operator and TransKarachi or identified by the Operator in its Service Delivery Plan;

(e) any improvement of the Services, including full details on any relevant passenger complaint, any suggested adjustment of the VOC Dispatch Schedule and Headway Targets and any performance improvement measure taken by the Operator.

1.17 Tow truck

1.17.1 [The Vehicle Supplier shall deliver to the Operator 1 (one) tow truck manufactured by [•].]

1.17.2 The tow truck vehicle shall be parked in the Depot and used by the Operator solely to move disabled, damaged or otherwise indisposed Vehicles.

1.17.3 The Operator shall be responsible for operation, maintenance and repairs of the tow truck vehicle at its own cost.

1.17.4 The Operator shall also ensure that the tow truck is driven by a qualified Driver and is kept in satisfactory operational condition (fair wear and tear excluded).

1.17.5 All other relevant maintenance obligations of the Operator concerning Vehicles shall apply *mutatis mutandis* to the tow truck vehicle.

1.18 Spare parts

1.18.1 The Vehicle Supplier (on behalf of TransKarachi) shall provide Spare parts and the supply of spare parts shall cover the period from the delivery of the first vehicles to approximately two years. As a minimum, a certain quantity of Spare parts will be kept by Vehicle Supplier (on behalf of TransKarachi) on hand at depot sites at all times for approximately two years. The Spare parts store shall be operated by suitably qualified staff members to manage such store.

1.18.2 Before the conclusion of the contract of Vehicle Supplier, the Vehicle Supplier (on behalf of TransKarachi) will also provide a final stock of spare parts and supplies at each depot facility.

1.18.3 The list and quantity of the spare parts to be provided (as mentioned in Clauses 1.18.1 and 1.18.2) by Vehicle Supplier on behalf of TransKarachi is attached as Schedule 1 to this Operational Specifications Schedule i.e. Part A, Part B and Part C (**Attached**). Whereas;

a) Part A provides quantity and details of Spare parts to be consumed approximately in two (2) years for 18-meter Vehicles.

b) Part B provides quantity and details of Spare parts to be consumed approximately in two (2) years for 12-meter Vehicles.

c) Part C provides quantity and details of Spare parts to be provided at Contract Closure of Vehicle Supplier.

1.18.4 Any leftover or quantity not consumed during the two (2) years mentioned in Clause 1.18.3 (a)&(b) above will also be handed over to the Operator free of cost.

1.18.5 The Operator shall ensure security of facilities at the Depot and storage of the spare parts.

1.18.6 Except above, the Operator shall take responsibility of provision of all replacement parts and supplies for all maintenance issues. The Operator shall procure any future spare parts and supplies pursuant to documentation provided by the Vehicle Supplier or required for maintenance and/ or operation of Vehicles.

1.18.7 The Operator will be responsible for all materials and associated costs for repair actions caused by road collisions or other unscheduled incidents.

1.18.8 The Operator shall keep record of each spare part used, reason for replacement, total spare used, remaining spare parts etc. and follow Protocol issued by TransKarachi for use, record and inventory of the same. The Operator shall provide to TransKarachi such record in prescribed time.

1.19 Tools and equipment

1.19.1 The Vehicle Supplier shall deliver two sets of the specified maintenance tools, software, and diagnostic equipment required to repair, service, and maintain the Vehicles. The list of tools to be provided is attached in Schedule 2.

1.19.2 The Operator shall procure any other tools, software and diagnostic equipment which it deems necessary to carry out the Services in accordance with the Agreement.

1.20 Electricity charging facilities

1.20.1 The Operator shall be entitled to use vehicle slow charging facilities installed at the Depot. The costs of electricity used for slow charging the Vehicles at the Depot shall be borne by the Operator. The Operator shall be responsible for use, care, maintenance and repair of the vehicle slow charging facilities installed at the Depot as further specified in the Property Use Agreement.

1.20.2 The Operator shall be entitled to use fast charging facilities located at the Depot, the Staging Area and Route end point. The costs of electricity used for fast charging the Vehicles at the Staging Area shall be borne by the

Operator. The Operator shall be responsible for use, care, maintenance and repair of the vehicle fast charging facilities installed at the Depot, the Staging Area and Route end point.

2. MILESTONES

- Milestone 1: Operations of [•] units 12-meter buses by [•]
- Milestone 2: Operations of [•] units 12-meter buses by [•]
- Milestone 3: Operations of [•] units 18-meter buses by [•]

3. KEY PERFORMANCE INDICATORS

3.1 KPIs

3.1.1 The Operator's performance shall be evaluated by means of key performance indicators ("**KPIs"**). Failure to comply with KPIs ("**Failure Events"**) shall lead to the application of performance deduction percentages as per the below table ("**Performance Deduction Percentage**"):

	KPI	**Failure Event**	**Performance Deduction Percentage (PD%)**
1	**ROAD SAFETY**	***Assessment through self-reporting***	
1.1	Prevention of Severe Accidents	Accident involving a Vehicle due to Driver's fault or malfunctioning of the Vehicle resulting in death or severe physical injury of a passenger or other person (**Severe Accident**)	50.0% per occurrence
1.2	Prevention of Material Accidents	Accident involving a Vehicle due to Driver's fault or malfunctioning of the vehicle resulting in minor physical injury of a passenger or other person or material damage to TransKarachi's assets (**Material Accident**)	15.0% per occurrence
1.3	Prevention of Minor Accidents	Accident involving a Vehicle due to Driver's fault or malfunctioning of the vehicle not resulting in any physical injury of a passenger or other person nor any material damage to TransKarachi's assets (**Minor Accident**)	5.0% per occurrence
1.4	Immediate Reporting of Emergencies	Emergency not reported to TransKarachi and the Police within one (1) hour of its occurrence	10.0% per occurrence
1.5	Prevention of Traffic Offences	Driver caught by the Police committing a traffic offence	2.5% per occurrence

	KPI	Failure Event	Performance Deduction Percentage (PD%)
2	**PUNCTUALITY**	***Assessment through automatic monthly reporting by the System Control Service Provider***	
2.1	Compliance with Scheduled Headways on Direct Routes	Departure of a Vehicle on a Direct Route (or non-departure) earlier than one (1) minute before scheduled departure time or later than one (1) minute after scheduled departure time (**Untimely Departure**)	1.0% per % of Untimely Departures
2.2	Compliance with Scheduled Headways on Corridor-only Routes	Excess Headway Time (as defined below) achieved by Vehicles on Corridor-only Routes in the month greater than 0.2 minute	2.5% per 0.1 minute in excess of 0.2 minute (rounded up to higher 0.1 minute)
3	**QUALITY OF SERVICE**	***Assessment through TransKarachi inspections / spot checks***	
3.1	Prevention of Driver Violations	Observation of a Driver Violation (as defined below)	0.1% per occurrence
3.2	Prevention of Operational Violations	Observation of an Operational Violation (as defined below)	0.1% per occurrence
4	**FLEET**	***Assessment through TransKarachi inspections / spot checks***	
4.1	Prevention of Severe Vehicle Defects	Vehicle used in Service in spite of presenting a Severe Vehicle Defect (as defined below)	5.0% per % of fleet inspected concerned (rounded up to higher % point of fleet inspected)
4.2	Prevention of Material Vehicle Defects	Vehicle used in Service in spite of presenting a Material Vehicle Defect (as defined below)	1.0% per % of fleet inspected concerned (rounded up to higher % point of fleet inspected)
4.3	Prevention of Minor Vehicle Defects	Vehicle used in Service in spite of presenting a Minor Vehicle Defect (as defined below)	0.5% per % of fleet inspected concerned (rounded up to higher % point of fleet inspected)
5	**REPORTING**	***Assessment through monitoring by TransKarachi***	

	KPI	Failure Event	Performance Deduction Percentage (PD%)
5.1	Audited financial statements of the Operator	Annual financial statements of the Operator, including all required constituent parts, not provided by specified submission date	1.5% per day of delay
5.2	Unaudited management accounts of the Operator	Quarterly unaudited management accounts of the Operator, (comprising a profit and loss account, balance sheet and cash flow statement), including all required constituent parts, not provided by specified submission date	1.0% per day of delay
5.3	Monthly Operations Report	Monthly Operations Report, including all required constituent parts, not provided by specified submission date	0.5% per day of delay
5.4	Transparent Self-Reporting	Misrepresentative Monthly Operations Report	Performance Deduction Percentage applicable for omitted or misrepresented Failure Event doubled
6	**OTHER**	***Assessment through TransKarachi inspections / spot checks***	
6.1	Compliance with Employment Opportunity Program	Non-compliance with any requirement enclosed in the Employment Opportunity Program	1.0% per occurrence
6.2	Compliance with Environmental Plan	Non-compliance with any requirement enclosed in the Environmental Program	1.0% per occurrence
6.3	Compliance with Gender Action Plan	Non-compliance with requirement enclosed in the Gender Action Plan	1.0% per occurrence
6.4	Dragnet Clause	Any act/instance which is non-conforming to, or constitutes a violation of, the obligations of the Operator enclosed in this Agreement or in rules, regulations or operational instructions given by TransKarachi, unless covered by another KPI	1.0% per occurrence

3.1.2 In case TransKarachi has determined that non-compliance with a KPI occurred due to reasons outside of the Operator’s control and responsibilities, that Failure Event shall not lead to any Performance Deduction Percentages.

3.2 Performance Deduction Percentage (PD%)

3.2.1 The Performance Deduction Percentage applicable for a given Month shall be:

(a) during the first three (3) Months from the Commencement Date, zero percent (0%); and

(b) from the fourth (4th) Month from the Commencement Date, the sum of Performance Deduction Percentages applicable for all events of non-compliance with KPIs having occurred during that Month, subject to a maximum of one hundred percent (100%).

3.2.2 On the tenth (10th) Business Day of each Month ("**Relevant Month**"), TransKarachi shall send to the Operator a notice informing it of the Performance Deduction Percentage which have been calculated for it for the previous Month with evidence.

3.2.3 If the Operator objects to the notice referred to in paragraph 3.2.2, the Operator shall inform TransKarachi thereof no later than the thirteenth (13th) Business Day of the Relevant Month and shall send written evidence supporting its objection.

3.2.4 TransKarachi shall then decide and give notice of its decision to the Operator no later than the seventeenth (17th) Business Day of each Relevant Month as to its reconsidered determination of the Performance Deduction Percentage for the previous Month.

3.3 Excess Headway Time/ Scheduled Headway Time Variations

3.3.1 TransKarachi shall designate a number of Stations ("**Timing Points**") where Excess Headway Time between Vehicles on a same Route, in each direction, is to be calculated.

3.4 Fleet Inspections

3.4.1 TransKarachi may at all reasonable times, directly or through a TransKarachi-appointed independent agent, observe, inspect and satisfy itself with the observance by the Operator of the "Fleet" Key Performance Indicators.

3.4.2 In order to ensure representatively of the sample of the fleet inspected, TransKarachi shall ensure that at least ten percent (10%) of the Fleet shall be inspected each Month, failing which no Performance Deduction Percentage shall be applied for that Month under the "Fleet" Key Performance Indicators.

3.5 Definitions

For the purposes of this Schedule:

3.5.1 **Direct Routes** means Routes which serve both Stations and Stops.

3.5.2 **Corridor-only Routes** means Routes which only serve Stations and, for the avoidance of doubt, may include up to two (2) off-Corridor Stations.

3.5.3 **Driver Violation** means a violation in relation to a Driver, including, but not limited to, any of the following:

(a) Failure to carry and display a personal card;

(b) Failure to present a valid PSV license;

(c) Engagement in operations without training;

(d) Inability to operate the vehicle logic unit;

(e) Ignorance about code of conduct or emergency procedures;

(f) Refusal to provide information to a passenger;

(g) Communication with passengers without any purpose during normal operations;

(h) Reading of unauthorised announcements;

(i) Failure to acknowledge or follow instructions issued by TransKarachi;

(j) Drunkenness on duty;

(k) Smoking while driving;

(l) Operation of sound or other unauthorized electronic equipment (cell phone, walkman, etc.) while driving;

(m) Carrying of weapons of any kind;

(n) Facilitation of a passenger travelling without fare or not informing the control centre about such activity;

(o) Unduly charging of a fare or tariff to a passenger;

(p) Abandoning and/or alighting from the Vehicle during normal operations;

(q) Verbal or physical ill-treatment of a passenger.

3.5.4 **Operational Violation** means a violation in relation to the operation of a Vehicle, including, but not limited to, any of the following:

(a) Vehicle not stopping and maintaining all doors open for a minimum of ten (10) seconds at a designated Station in accordance with its scheduled Route;

(b) Vehicle not stopping and opening all doors at a designated Stop whereas the stop button was activated;

(c) Incorrect approach to Station or Stop;

(d) Incorrect alignment between Vehicle and Station and/or Stop;

(e) Incorrect operation of a boarding gate at a Station and/or Stop;

(f) Vehicle stopping ahead of the stop bar;

(g) Vehicle stopping at a location not included in the scheduled Route;

(h) Vehicle driving outside of a designated Route;

(i) Vehicle driving outside of operating hours;

(j) Vehicle overtaking another vehicle of the same Route;

(k) Vehicle parking outside of designated bays;

(l) Vehicle blocking the Corridor, a road or an intersection or obstructing the flow of vehicles;

(m) Vehicle reversing on the Corridor or at a Station;

(n) Vehicle driving without doors fully closed;

(o) Vehicle driving at night with lights off.

3.5.5 **Severe Vehicle Defect** means a defect to a Vehicle affecting or potentially affecting the roadworthiness of that Vehicle, the safety of passengers, the collection of fares or operational control by TransKarachi, including, but not limited to, any of the following:

(a) any Driver's Vehicle Defect Report (in the form attached as Schedule 3) for any of the last 30 (thirty) days being unavailable, incomplete or misrepresentative;

(b) any Safety Inspection Report (in the form attached as Schedule 4) for any of the last 30 (thirty) days being unavailable, incomplete or misrepresentative;

(c) any item from the Safety Inspection Checklist (in the form attached in Part 1 of Schedule 4) being defective or not in full and complete working order;

(d) any validator being defective or not in full and complete working order;

(e) operations control being defective or not in full and complete working order;

(f) control management being defective or not in full and complete working order.

3.5.6 **Material Vehicle Defect** means a defect to a Vehicle affecting the usage of the BRT System, including, but not limited to, any of the following:

(a) any item from the Driver's Vehicle Defect Report (in the form attached as Schedule 3) being defective or not in full and complete working order;

(b) any destination display being defective or not in full and complete working order;

(c) any passenger information display being defective or not in full and complete working order;

(d) passenger announcement system being defective or not in full and complete working order.

3.5.7 **Minor Vehicle Defect** means a defect to a Vehicle affecting the comfort of passengers or the appearance of a Vehicle, including, but not limited to, any of the following:

(a) Vehicle not being in satisfactory operational condition (as per point 1.1.2 above) and/or any item from the Driver's Vehicle Defect Report (in the form attached as Schedule 3) being unclean or in untidy condition;

(b) the average interior temperature as measured by TransKarachi directly or through system (as per point 1.6.3 above) being below 23°C or above 25°C when the ambient temperature is 25°C or other such temperature specified by TransKarachi;

(c) up-to-date map (A3 size) with all Stations and/or Stops being not displayed properly in a Vehicle interior;

(d) currently applicable fares being not displayed properly in a Vehicle interior;

(e) current passenger timetable being not displayed properly in a Vehicle interior;

(f) any required TransKarachi poster/sticker being not displayed properly in a Vehicle interior;

(g) advertising outside of designated advertising surfaces;

(h) any type of decoration or non-functional item or marking being displayed inside or outside a Vehicle without having been pre-approved by TransKarachi.

3.6 Material breach

3.6.1 If, counting from the fourth (4th) complete Month from the Commencement Date onwards:

(a) the Performance Deduction Percentage is equal to one hundred percent (100%) for three (3) consecutive Months; or

(b) the Performance Deduction Percentage is equal to one hundred (100%) for any six (6) Months during any twelve (12)-Month period,

then this shall constitute an Operator’s material breach under the terms of the Agreement.

Schedule 1

Spare parts

(Attached as Separate files for Spare Parts to be consumed a) During Two years; and b) to be handed over at end of two years)

Schedule 2

Tools

(Attached as Separate File)

Schedule 3

Driver's Vehicle Defect Report

Driver's Name:	Date:
Vehicle Reg.:	
Tachograph reading beginning of shift:	End of shift:
Fleet / Serial no.:	Odometer Reading:

Daily or shift check (tick or cross)

Fuel / Oil Leaks		Wipers		Mirrors	
Battery (if Easily Accessible)		Washers		Steering	
Tyres and Wheel Fixing		Horn		Heating / Ventilation	
Brakes (incl. ABS/EBS)		Glass		Lights	
Doors and Exits		Reflectors		Body interior	
Indicators / Side Repeaters		Body Exterior		Excessive Engine Exhaust Smoke	
Fire Extinguisher		First-Aid Kit		Emergency Exit Hammer	
Seats Fixtures and Coverings		Disabled Accessibility Requirements		Registration Plates	
Floor Coverings		On-board Units		Fans or Other Air Handling Equipment	
Radios or other Communication Equipment		Passenger Information Displays		Driver's Console	

REPORT DEFECTS HERE:	Defects warranting a refusal to use the Vehicle:
Defects reported to:	RECTIFIED:
Write NIL here if no defects found	Driver's signature:

Note: Format may be revised by TransKarachi at its discretion to covered all defects faced during operations

Defects rectified by: ....

Signature: ....

Date: ....

Schedule 4

Safety Inspection Report

Vehicle Reg.:	Odometer Reading:
Make and Type:	
Date of Inspection:	ISO Wk No.:
Operator:	

(a)	**'Serviceable' (col 4)** – enter the appropriate code:			
	□ □	= Satisfactory = Safety Item Defect	**R** **N/A**	= Repair Required = Not Applicable
	M	= Monitor (possible maintenance required before next SI)		

Part 1 – Inspection

Check No	**Item Inspected**	**Serviceable**	**Defect Found**	**Rectified By**
1	Driver's Seat			
2	Seat Belts and Supplementary Restraint Systems			
3	Mirrors and Indirect Vision Devices			
4	Glass and View of the Road			
5	Accessibility Features			
6	Windscreen Washers and Wipers			
7	Speedometer / Tachograph			
8	Horn			
9	Driving Controls			
10	Steering Control			
11	Service Brake Pedal			

12	Service Brake Operation			
13	Pressure / Vacuum Warning and Build Up			
14	Hand Lever Operating Mechanical Brakes			
15	Hand Operated Brake Control Valves			
16	Driver’s Accommodation			
17	Interior of Body, Passenger Entrance, Exit Steps and Platforms			
18	Passenger Doors, Driver’s Doors and Emergency Exits			
19	Registration Plates			
20	Security of Body			
21	Exterior of Body including Luggage Compartments			
22	Exhaust Emissions			
23	Road Wheels and Hubs			
24	Size and Type of Tyres			
25	Condition of Tyres			
26	Bumper Bars			
27	Spare Wheel and Carrier			
28	Condition of Chassis			
29	Wings and Wheel Arches			
30	Vehicle to Trailer Coupling			
31	Speed Limiter			
32	Electrical Wiring and Equipment			
33	Engine and Transmission Mountings			

34	Oil and Waste Leaks			
35	Fuel Tanks and System			
36	Exhaust and Waste Systems			
37	Steering Mechanism			
38	Suspension			
39	Axles, Stub Axles and Wheel Bearings			
40	Transmission			
41	Additional Braking Devices			
42	Brake Systems and Components			
43	Reflectors and Rear Markings			
44	Lamps			
45	Direction Indicators and Hazard Warning Lamps			
46	Aim of Headlamps			
47	Ancillary Equipment			
48	Other Dangerous Defects			

Condition of Tyres (enter N/A if not applicable)

49	Axle 1	Axle 2	Axle 3	Axle 4
o/s out	mm	mm	mm	mm
	bar	bar	bar	bar
o/s in		mm	mm	mm
		psi	psi	psi
n/s in		mm	mm	mm
		bar	bar	bar
n/s out	mm	mm	mm	mm
	bar	bar	bar	bar

C: Brake Performance (Laden / Unladen) (roller brake /	**D: Road Test**

decelerometer test)				
Check No	**IM Ref**	**Item inspected**	**Efficiency**	**Inspector Comments:**
50*	71	Service Brake Performance	%	
51*	72	Secondary Brake Performance	%	
52*	73	Parking Brake Performance	%	

Note: Format may be revised by TransKarachi at its discretion to covered all defects faced during operations

Schedule 5

Maps

Schedule 6

Technical & Functional Specifications of 12-meter and 18-meter Vehicles

(Attached as Separate File)

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 - DRAFT CONTRACTS

OPERATOR CONTRACTS – ANNEX C

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

ANNEX C

PAYMENT CALCULATION SCHEDULE

1. Monthly Payment

1.1 For each Month (m), the Operator shall be entitled to a payment (**Monthly Payment**) calculated in accordance with the following formula:

$$\mathbf{Monthly\ Payment_m\ (MP_m)}$$

$$= \mathbf{Kilometre\ Charge}_{\boldsymbol{m}} \times$$

$$\times\,(\mathbf{100\%} \times \mathbf{OnKm18_d} + [\mathbf{70}\%] \times \mathbf{OnKm12_d} + [\mathbf{75}\%] \times \mathbf{OffKm12_d}) \times (\mathbf{1} - \mathbf{PP}\%) - \mathbf{RF}$$

where:

Kilometre Charge$_{\mathbf{m}}$ means the Kilometre Charge applicable for Month (m);

OffKm12$_{\mathbf{d}}$ means the number of Bus Kilometres driven outside of the Corridor by 12-metre Vehicles (Starting from dedicated Corridor point) during Month (m) reported by System Control Service Provider;

OnKm12$_{\mathbf{d}}$ means the number of Bus Kilometres driven on the Corridor by 12-metre Vehicles (starting from dedicated Corridor point) during Month (m) reported by System Control Service Provider;

OnKm18$_{\mathbf{d}}$ means the number of Bus Kilometres driven on the Corridor by 18-metre Vehicles during Month (m) reported by System Control Service Provider;

PP% means the Performance Payout Percentage, which shall be ten percent (10%); and

RF means any amount to be retained in relation to the provisioning of the Reserve Fund.

1.2 The Operator shall submit the travelled Bus Kilometres after completion of Month (m). Within ten (10) days of receipt of the Bus Kilometres from the Operator, TransKarachi shall notify the amount of the Monthly Payment for Month (m). The Operator shall raise an invoice to TransKarachi for an amount equivalent to the Monthly Payment for Month (m) (plus any applicable Sales Tax on Services). The Monthly Payment for Month (m) shall be made by the Fund Manager within ten (10) days after receipt of invoice by TransKarachi.

1.3 Indexation

Each Month (m), the Kilometre Charge shall be indexed in accordance with the following formula:

$$\mathbf{Kilometre\ Charge_m}$$

$$= \mathbf{Kilometre\ Charge} \times \left([\mathbf{50}\%] \times \frac{\mathbf{CPI_{m-2}}}{\mathbf{CPI_{ED-2}}} + [\mathbf{10}\%] \times \frac{\mathbf{HWEGFPI_{m-2}}}{\mathbf{HWEGFPI_{BSD-2}}}\right)$$

where:

CPI$_{\mathbf{ED-2}}$ means the general Consumer Price Index for the Month before the latest completed Month upon the Effective Date as published by the Pakistan Bureau of Statistics, or in case it ceases to be published any equivalent index as agreed by the Parties;

CPI_{m-2} means the general Consumer Price Index for the Month before the latest completed Month upon the current date as published by the Pakistan Bureau of Statistics, or in case it ceases to be published any equivalent index as agreed by the Parties;

$HWEGFPI_{BSD-2}$ means the Housing, Water, Electricity, Gas and Fuels Price Index for the Month before the latest completed Month upon the Bid Submission Date as published by the Pakistan Bureau of Statistics, or in case it ceases to be published any equivalent index as agreed by the Parties;

$HWEGFPI_{m-2}$ means the Housing, Water, Electricity, Gas and Fuels Price Index for the Month before the latest completed Month upon the current date as published by the Pakistan Bureau of Statistics, or in case it ceases to be published any equivalent index as agreed by the Parties; and

Kilometre Charge means [•] Pakistani Rupees (PKR [•]).

2. Monthly Performance Payment

2.1 For each Month (m), the Operator shall be entitled to a payment (**Monthly Performance Payment**) calculated in accordance with the following formula:

$$\mathbf{Monthly\ Performance\ Payment_m}$$

$$= (\mathbf{1} - \mathbf{PD\%_m}) \times \mathbf{MP_m} \times \frac{\mathbf{PP\%}}{(\mathbf{1} - \mathbf{PP\%})} - \mathbf{RF}$$

where:

MP_m means the Monthly Payment which the Operator is entitled to for Month (m), plus any amount retained from that Monthly Payment in relation to the provisioning of the Reserve Fund.

$PD\%_m$ means the Performance Deduction Percentage applicable to the Operator for Month (m).

PP% means the Performance Payout Percentage, which shall be ten percent (10%).

RF means any amount to be retained in relation to the provisioning of the Reserve Fund.

2.2 Within ten (10) days of the end of Month (m), TransKarachi shall notify the amount of the Monthly Performance Payment for Month (m). The Operator shall raise an invoice to TransKarachi for an amount equivalent to the Monthly Performance Payment for Month (m) (plus any applicable Sales Tax on Services). The Monthly Performance Payment for Month (m) shall be made by the Fund Manager within five (5) Business Days of TransKarachi receiving such invoice.

3. Yearly Compensation Payment

3.1 For each Operational Year (y), should the Operator, for any reason not attributable to itself, be prevented from operating the Minimum Annual Kilometre Distance, then it shall be entitled to a payment (**Yearly Compensation Payment**) calculated in accordance with the following formula:

$$\mathbf{Yearly\ Compensation\ Payment}_y$$

$$= \mathbf{Kilometre\ Charge} \times [\mathbf{30}\%] \times \frac{\mathbf{CPI_{m-2}}}{\mathbf{CPI_{ED-2}}} \times \Delta\mathbf{Km_y} - \mathbf{RF}$$

where:

$\text{CPI}_{\text{ED-2}}$ means the general Consumer Price Index for the Month before the latest completed Month upon the Effective Date as published by the Pakistan Bureau of Statistics, or in case it ceases to be published any equivalent index as agreed by the Parties;

$\text{CPI}_{\text{m-2}}$ means the general Consumer Price Index for the Month before the latest completed Month upon the first day of Operational Year (y) as published by the Pakistan Bureau of Statistics, or in case it ceases to be published any equivalent index as agreed by the Parties;

ΔKm_y means the Minimum Annual Kilometre Distance for Operational Year (y) minus the number of Bus Kilometres driven by Vehicles during Operational Year (y), or zero, whichever is higher;

Kilometre Charge means [•] Pakistani Rupees (PKR [•]); and

RF means any amount to be retained in relation to the provisioning of the Reserve Fund.

3.2 Within ten (10) days of receipt of the travelled Bus Kilometres for the last Month of Operational Year (y) from the Operator, TransKarachi shall notify the amount of the Yearly Compensation Payment for Operational Year (y), if any. The Operator shall raise an invoice to TransKarachi for an amount equivalent to the Yearly Compensation Payment for Operational Year (y) (plus any applicable Sales Tax on Services). The Yearly Compensation Payment for Operational Year (y) shall be made by the Fund Manager within twenty-one (21) days of TransKarachi receiving such invoice.

KARACHI

BUS RAPID TRANSIT

PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 - DRAFT CONTRACTS

OPERATORS CONTRACT – ANNEX D

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

PROPERTY USE AGREEMENT

(*To be printed on Judicial Stamp Pape of Prescribed Fee*)

between

[TrasnKarachi]

and

[*BRT Company*]

Date: […]

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DEFINITIONS AND INTERPRETATION 1
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THIS PROPERTY USE AGREEMENT (the "**Agreement**") is made on [•] 2019

BETWEEN

1. **[TRANSKARACHI**, a company established under Section 42 of the Companies Act of 2017 with its office located at [•], Karachi, Pakistan (hereinafter referred to as "**TransKarachi**" which expression shall include its successors-in-interest and permitted assigns)]; and

2. <***Insert name of the BRT Company***>, a company incorporated in [•], with company registration no. [•] and whose registered address is at [•] (the "**Operator**").

TransKarachi and the Operator are individually referred to herein as a "**Party**" and collectively as the "**Parties**".

WHEREAS:

A. The Parties have entered into the BRT Vehicle Operator Agreement whereby it is one of the conditions precedent to execute this Agreement.

B. TransKarachi wishes to grant a non-exclusive license to the Operator to utilize certain properties as the Depot and the Staging Area and the Operator wishes to use such properties, in accordance with the terms and conditions of this Agreement.

C. As consideration for using the Property, the Operator hereby agrees to provide the Services it is required to provide under the BRT Vehicle Operator Agreement.

NOW THE AGREEMENT PROVIDES:

PART A - GENERAL

1. Preliminary Matters

1.1 Definitions and Interpretation

1.1.1 The defined words and expressions set out in Clause 1 of Annex A([*Definitions and Interpretation*) hereof and the provisions relating to the construction and interpretation of the Agreement set out in Clause 2 of Annex A (*Definitions and Interpretation*])hereof shall apply to the Agreement.

1.2 Effect of this Agreement

1.2.1 The Parties hereby agree that this Agreement shall immediately be binding on them as of the Effective Date.

1.3 Conditions Precedent

1.3.1 If conditions precedent under the BRT Vehicle Operator Agreement remain unfulfilled (and/or are not waived) for an unreasonably long time (in the opinion of TransKarachi), then, save and except the Surviving Provisions, TransKarachi shall be entitled to consider this Agreement null and void *ab initio* and TransKarachi shall be discharged from any and all liability that may have arisen or that may arise under this Agreement.

PART B - PROPERTY USE AND MAINTENANCE OBLIGATIONS

2. Property Use

2.1 General

2.1.1 TransKarachi's signing this Agreement shall indicate its consent to the grant of a non-exclusive license to the Operator for the Operator's non-exclusive use of the Property with the effect as of the Commencement Date (Tentative layout of depot is attached as Annex-B).

2.1.2 The Operator hereby agrees to use the Property in accordance with the terms and conditions of this Agreement and the Applicable Law, including all applicable environmental and health and safety regulations.

2.1.3 For the duration of this Agreement, unless agreed otherwise in writing by the Parties, the Operator shall use the Property solely for the provision of the Services in accordance with the BRT Vehicle Operator Agreement.

2.1.4 The Operator acknowledges and agrees that except for the grant of a non-exclusive license to use the Property for the purposes of this Agreement, this Agreement does not grant or transfer any right or interest in the Property to the Operator. Legal title to and ownership of the Property shall remain with TransKarachi.

2.2 No payment

2.2.1 The Parties agree that the Operator's use of the Property is required and/or necessary for the Operator to be able to provide the Services under the BRT Vehicle Operator Agreement.

2.2.2 Subject to Clause 2.2.2 and Clause 7 (*Utilities costs*) and to the extent not agreed otherwise by the Parties, the Operator is not required to make any payments to TransKarachi for the use of the Property. However, in consideration of the grant of the license to use the Property, the Operator shall provide the Services under the BRT Vehicle Operator Agreement to TransKarachi.

2.2.3 To the extent that the use of the Property pursuant to this Agreement is taxable, the Operator agrees to bear all taxes, charges, duties and/or tariffs by itself and, upon request from TransKarachi, provide proof that such obligations have been satisfied in full.

2.3 Commencement and Term

2.3.1 The Operator shall use the Property from the Commencement Date until the Termination Date.

2.3.2 Unless this Agreement is earlier terminated, the Operator shall continuously use the Property for a term of the BRT Vehicle Operator Agreement, unless the Parties agree in writing otherwise.

3. Hand-over of the Property

3.1 At the time of the hand-over of the Property, the Operator and TransKarachi shall jointly carry out an inspection of the Property. The state of the Property shall be recorded in writing and that writing signed by the Operator and TransKarachi.

4. Maintenance of the Property

4.1 The Operator shall, at all times during the term of this Agreement, ensure that the Property is kept in a state of good repair and in a satisfactory operational condition (fair wear and tear excluded) and is maintained in accordance with the provisions of this Agreement and the BRT Vehicle Operator Agreement.

4.2 The Operator shall keep detailed Property maintenance and repair records for the duration of this Agreement. TransKarachi shall be entitled to audit such records upon giving the Operator no less than twenty-four (24) hours notice. The Operator shall also provide these records (or any portions thereof) as may be reasonably requested by TransKarachi in such format as TransKarachi may require.

4.3 TransKarachi shall be entitled to conduct unscheduled inspections of the Property to ensure that it continues to be in compliance with the Agreement and is in satisfactory operational condition (fair wear and tear excluded). If the Property is found not to be in compliance with the Agreement or in unsatisfactory condition, TransKarachi shall immediately inform the Operator and the Operator shall, within a reasonable time or a time determined by TransKarachi, effect the required repairs/maintenance at its own cost.

4.4 If a Property requires repair/maintenance and is not so repaired/maintained by the Operator within a reasonable time or the time determined by TransKarachi, TransKarachi shall be entitled to either liquidate the Performance Guarantee for purposes of effecting such repairs/replacement and/or access the Reserve Fund for purposes of effecting such repairs/replacement. Any usage of the Reserve Fund by TransKarachi shall obligate the Operator to replenish the Reserve Fund to the required and/or agreed levels.

4.5 With respect to the Property the Operator shall at its own expense and without recourse to TransKarachi:

4.5.1 be responsible for the Depot and the Staging Area security and accordingly shall enter into security services agreement with the relevant security company;

4.5.2 be responsible for access control of third parties, staff and Vehicles to the Depot and/or the Staging Area;

4.5.3 exercise overall management and maintenance of the Property, including garages, offices, park yards and other buildings comprising the Depot or the Staging Area;

4.5.4 clean the Depot and the Staging Area on as-need basis, including all signage and facilities and areas for Vehicles’ washing, fuelling and maintenance;

4.5.5 promptly and properly repair or make good all damage occurring in the interior and exterior of the Depot or the Staging Area, whatever the cause of such damage, and including damage to any part of the interior of the Depot or the Staging Area or to any window, door, appurtenance, fixture, fitting, and replace all such items or parts thereof (as well as any keys) which have been broken, lost or destroyed (again regardless of cause);

4.5.6 use the Depot exclusively to park, refuel and maintain the Vehicles and not use the Depot and or the Depot Equipment or allow any of them to be used, in whole or part, for any purpose other than that of carrying on the Services;

4.5.7 establish and manage a system of treating waste materials and recycling of disposable materials and obtain any environmental or waste management approvals to the extent required under the Applicable Law;

4.5.8 not leave refuse or allow it to accumulate in or about the Depot or the Staging Area except in the refuse bins or containers designated by law for the type of waste being handled; and the Operator hereby warrants that it shall deal with of all waste and effluent in accordance with the Applicable Law;

4.5.9 not bring into the Depot or the Staging Area any article which, by reason of its weight or other characteristics, is liable to cause damage to the Depot or the Staging Area;

4.5.10 refrain from interfering with the electrical or plumbing serving the Depot or the Staging Area, except as may be strictly necessary to enable the Operator to carry out its obligations of maintenance and repair in terms of this Agreement;

4.5.11 respect and maintain social responsibility in relation to any community in the immediate vicinity of the Depot or the Staging Area;

4.5.12 allow TransKarachi and its authorized personnel and agents at any time upon a short notice unrestricted access to the Depot or the Staging Area to inspect the operation and maintenance of the Depot or the Staging Area as well as to perform any necessary repairs, replacements or other works;

4.5.13 not allow or authorize any advertisement to be fixed in the Depot or the Staging Area without prior written approval of TransKarachi; and

4.5.14 use the parking area exclusively to park, service and maintain the Vehicles.

5. Alterations to the Property

5.1 The Operator shall not, without the prior written consent of TransKarachi, make any alterations or additions to the Property, including electrical and plumbing installations.

5.2 If the Operator does alter or add to the Property in any way, in breach of Clause 5.1, the Operator shall, if so required in writing by TransKarachi and at its own cost, restore the Property to the same condition as it was prior to such alteration or addition having been made. This clause shall not be construed as excluding any other or further remedy which TransKarachi may have in consequence of a breach by the Operator of Clause 5.1.

6. Depot Equipment

6.1 With respect to the Depot Equipment the Operator shall at its own expense and without recourse to TransKarachi:

6.1.1 maintain the Depot Equipment in good working order, fair wear and tear excluded; and

6.1.2 promptly and properly repair or make good all damage occurring to the Depot Equipment, whatever the cause of such damage.

7. Utilities costs

7.1 The Operator shall, from the Commencement Date, be liable for costs of all electricity, water and other utilities consumed, and accordingly shall enter into electricity, water, and other utility supply agreements with the relevant utility providers.

7.2 The Operator shall timely pay the cost of all electricity, water and other utilities consumed at or on the Property.

8. Defects or damage to the Property

8.1 In the event that Operator becomes aware of any defect or damage to the Property, the Operator shall immediately notify TransKarachi of such defect or damage and shall take all steps, at its own cost, as are in the circumstances reasonable to mitigate any risk to safety and any losses that TransKarachi would suffer or incur as a result of such defect or damage to the Property.

8.2 The Operator shall take part in such meetings as may be necessary and otherwise coordinate and co-operate with TransKarachi to arrange for rectification or replacement (as appropriate) of defects, damage or loss to the Property.

8.3 If it is determined that the Construction Company is liable for a defect to the Property, the Operator shall cooperate with TransKarachi and the Construction Company in rectification of such defect to ensure that TransKarachi’s rights under the relevant warranty, guarantee or defect liability provisions arising from the agreement with the Construction Company are properly exercised and protected.

PART C - BREACH AND TERMINATION

9. Breach and Termination

9.1 If the Operator commits a material breach of this Agreement and fails to remedy the breach within ten (10) Business Days after receipt from TransKarachi of a notice calling upon it to do so or such other time as specified by TransKarachi or agreed by the Parties then TransKarachi shall be entitled, in addition to and without prejudice to any other right it may have under Applicable Law or in accordance with this Agreement, to seek specific performance of this Agreement or to terminate this Agreement forthwith on notice to the Operator and in either event, to recover such damages as it may have sustained.

9.2 For purposes of this Agreement, a material breach shall be if the Operator:

9.2.1 commits a material breach under the BRT Vehicle Operator Agreement; or

9.2.2 delegates, cedes or sub-contracts this Agreement or part thereof in contravention of the provisions hereof without having obtained TransKarachi's prior written consent; or

9.2.3 Abandons the Property or any of its obligations under this Agreement; or

9.2.4 consistently fails to observe any provision of this Agreement (despite being given notice in relation thereto).

9.3 If TransKarachi commits a material breach of this Agreement and fails to remedy the breach within ten (10) Business Days after receipt from the Operator calling upon it to do so then the Operator shall be entitled, in addition to and without prejudice to any other right it may have under Applicable Law or under the terms of this Agreement, to seek specific performance of the terms of this Agreement or to terminate this Agreement upon sixty (60) days' notice to TransKarachi and in either event, to recover such costs, losses and damages as it may have sustained.

9.4 In the event of termination of this Agreement:

9.4.1 TransKarachi shall be entitled to immediately take possession of the Property and the Operator shall be required to do all things necessary to this effect, including returning to TransKarachi all keys and access cards; and

9.4.2 the Operator shall promptly cause the necessary repair or replacement to be effected to the Depot, the Depot Equipment and/or the Staging Area at the Operator's own expense, failing which TransKarachi shall have the right to either claim specific performance and/or set-off any repair or replacement costs from any payment due to the Operator, within TransKarachi's sole discretion; and

9.4.3 all alterations or additions made to the Property shall become the property of TransKarachi; subject to any prior written agreement to the contrary between the Parties, the Operator shall not have any claim against TransKarachi for compensation for any alterations or additions to the Property; and

9.4.4 TransKarachi shall be entitled to appoint auditors to check the Property and/or verify all relevant books, records and other data of the Operator and the Operator shall give full cooperation in that regard and make all such information available to TransKarachi on request.

PART D - MISCELLANEOUS MATTERS

10. Disputes

10.1 For the purposes of this Clause 10, the term "dispute" shall be interpreted in its widest sense and shall include any dispute or difference in connection with or in respect of the conclusion or existence of this Agreement, the carrying into effect of this Agreement, the interpretation or application of the provisions of this Agreement, the Parties' respective rights and obligations in accordance with and arising out of this Agreement or the validity, enforceability, rectification, termination or cancellation, whether in whole or in part, of this Agreement.

10.2 Save as otherwise provided for in this Agreement, any dispute between the Parties arising in connection with this Agreement shall be resolved in accordance with the provisions of clause 39 (*Dispute Resolution*) of the BRT Vehicle Operator Agreement.

11. Property insurance

11.1 The Operator shall effect and maintain 'all risk' property insurance in relation to the Property. Such insurance shall, among other things, provide cover in respect of loss or damage to the Property resulting from fire, theft and weather damage. TransKarachi shall be a co-insured party under such insurance and the Operator shall be liable for and pay all premiums in respect of such insurance.

12. Indemnity

12.1 The Operator shall indemnify and hold harmless TransKarachi and its personnel against and from all liabilities, claims, damages, loss, expenses and costs (including legal fees and expenses) which arise out of or in relation to any liabilities, claims, damages, loss, expenses or costs (including legal fees and expenses) incurred by TransKarachi or third parties on account of the Operator's use of the Property or Operator's breach of any of its obligations under this Agreement.

13. Periodic review of the Agreement

13.1 In view of the long-term nature of this Agreement and in order to provide a continuous means for the assessment of:

13.1.1 TransKarachi's contract management systems;

13.1.2 various aspects of the relationship between the Parties which would allow for inter alia an improvement in conflict resolution and the sharing of information between the Parties,

the Operator acknowledges that TransKarachi will review the provisions of this Agreement every three (3) years for the duration of this Agreement.

13.2 To the extent that TransKarachi wishes to propose any amendment to this Agreement pursuant to such review, such proposal shall be discussed and considered in good faith, but shall not be of any force or effect unless reduced to writing and signed by or on behalf of both Parties. For the avoidance of doubt, should the Parties fail to reach agreement as provided for in this Clause **Error! Reference source not found.**, such failure shall not constitute a d ispute as contemplated in Clause 10 (*Disputes*).

14. Addresses and notices

14.1 All notices under this Agreement shall be made by the Parties in accordance with clause 49 (*Addresses and notices*) of the BRT Vehicle Operator Agreement.

15. Change in Law

15.1 The Operator acknowledges and agrees that it shall take full risk and responsibility for a Change in Law occurring. Notwithstanding the foregoing, if a Change in Law occurs or is imminent that affects the rights and obligations of the Operator under this Agreement, the Operator shall notify TransKarachi within fourteen (14) days of the date of such Change in Law occurring or (if earlier) coming to the attention of the Operator and the Parties shall discuss the effects of the Change in Law and endeavour to arrive at a resolution.

15.2 Any resolution reached between the Parties shall be recorded in writing and such record shall be signed by both Parties.

16. Remedies

16.1 No remedy conferred by this Agreement is intended to be exclusive of any other remedy which is otherwise available at law, by statute or otherwise. Each remedy shall be cumulative and in addition to every other remedy given hereunder or now or hereafter existing at law, by statute or otherwise. The election of any one or more remedy by any of the Parties shall not constitute a waiver by such Party of the right to pursue any other remedy.

17. Confidentiality

17.1 Each Party shall at all times keep in confidence the Confidential Information of the other Party which it may acquire for the purposes of or in connection with this Agreement (whether prior to or after the Commencement Date) and shall not use or permit the use of such Confidential Information and shall procure that its employees shall not use the Confidential Information, for any other purpose and shall not disclose such Confidential Information to any third party.

17.2 Notwithstanding clause 17.1, a Party may disclose the Confidential Information of the other Party to such former Party's employees or Authorised Representatives to the extent that such employees or Authorised Representatives need to know the Confidential Information and shall ensure that such employees or Authorised Representatives are aware of and comply with, the confidentiality obligations contained in this clause 17.

17.3 Each Party shall take all such steps as may be reasonably necessary to prevent the Confidential Information of the other Party from falling into the hands of an unauthorised third party.

17.4 The Operator shall not make any comments to the media relating to this Agreement and any related matter nor shall it respond to any queries from the media without the prior written approval of TransKarachi.

18. Severance

18.1 In the event that any provision of the Agreement is held by any judicial or other competent authority to be illegal, invalid or unenforceable that provision shall be severed to the extent necessary to make the Agreement enforceable, and it shall not affect or impair the validity, legality or enforceability of any of the other provisions of the Agreement.

19. No agency

19.1 No provision of this Agreement shall be construed as constituting an agency, partnership, or joint venture between the Parties and neither Party shall have any express or implied TransKarachi to bind the other Party in any way or to represent the other Party unless specifically provided to the contrary in this Agreement, and, for the avoidance of doubt, this Clause 19 (*No agency*) shall not affect or otherwise derogate from the obligations and powers of the Operator in relation to handing over of the Vehicles to other authorised parties as contemplated in this Agreement or the BRT Vehicle Operator Agreement.

19.2 The Operator is an independent contractor performing the Agreement. The Operator is not an employee or agent of TransKarachi.

20. Corruption and Fraud

20.1 The Operator warrants that in entering into the Agreement it has not committed any Prohibited Act.

20.2 In the event that the Operator is contacted by a Public Official requesting or suggesting that the Operator act in a manner which would constitute a Prohibited Act, the Operator shall immediately provide TransKarachi in writing with full details of the request (including the identity of the Public Official making the request).

20.3 Without prejudice to clause 20.2, the Operator shall ensure that its staff undertaking activities in connection with the Agreement are subject to similar obligations to those set out in this clause 20 and the Operator shall enforce such obligations.

20.4 In the event that the Operator fails to comply with the requirements of this Clause 20 TransKarachi shall be entitled to terminate the Agreement pursuant to Clause 9 (*Termination and Breach*).

21. Entire Agreement

21.1 This Agreement constitutes the entire agreement between the Parties in relation to all matters contained herein, including all understandings, rights, responsibilities, duties and obligations and supersedes all prior arrangements, representations, communications, negotiations, agreements and contracts (whether written or oral) made between or entered into by the Parties with respect thereto prior to the Effective Date. None of the Parties shall have any claim or right of action arising from any undertaking, representation or warranty not included in this Agreement.

22. No stipulation for the benefit of a third person

22.1 Save as is expressly provided for in this Agreement, no provision of this Agreement constitutes a stipulation for the benefit of a third person which, if accepted by the person, would bind any Party in favour of that person.

23. No representations

23.1 A Party may not rely on any representation which allegedly induced that Party to enter into this Agreement, unless the representation is provided in this Agreement.

24. Amendment

24.1 Except as set out elsewhere in this Agreement, no modification, amendment, addendum or variation to the accordance with the Agreement shall be effective or binding, unless it:

24.1.1 is made in writing; and

24.1.2 expressly sets out the modification, amendment, addendum or variation to the accordance with the Agreement; and

24.1.3 refers to the Agreement; and

24.1.4 is signed and dated by a representative of each Party.

25. Indulgences

25.1 The grant of any indulgence, extension of time or relaxation of any provision by a Party under this Agreement shall not constitute a waiver of any right by the grantor or prevent or adversely affect the exercise by the grantor of any existing or future right of the grantor.

26. General co-operation

26.1 The Parties shall co-operate with each other and shall each execute and deliver to the other Party such other instruments and documents and take such other actions as may be reasonably requested from time to time in order to carry out, evidence and confirm their rights and the intended purpose of this Agreement.

27. Governing law

27.1 This Agreement is to be governed, interpreted and construed in accordance with the laws of the Islamic Republic of Pakistan.

28. Language

28.1 Unless expressly notified in advance by TransKarachi, the primary language of the Agreement shall be English. All documents and communications issued between the Parties shall be in English. Unless expressly notified in advance by TransKarachi, all minutes of meetings shall be issued in English.

29. Independent advice

29.1 Each of the Parties hereby respectively agrees and acknowledges that:

29.1.1 it has been free to secure independent legal advice as to the nature and effect of each provision of this Agreement and that it has either taken such independent legal advice or has dispensed with the necessity of doing so; and

29.1.2 each provision of this Agreement (and each provision of the Annexes) is fair and reasonable in all the circumstances and is part of the overall intention of the Parties in connection with this Agreement.

30. Good faith

30.1 The Parties shall, at all times, act in good faith towards each other and shall not bring the other Party into disrepute.

31. Survival of rights, duties and obligations

31.1 The Surviving Provisions will survive termination or completion of the Agreement.

31.2 In the event that the Agreement is terminated or completed, neither Party shall be liable to the other Party except:

31.2.1 under the Surviving Provisions; or

31.2.2 in respect of any breach of the Agreement occurring before such termination or completion; or

31.2.3 any rights or liabilities between the Parties that were pre-existing as at the date of termination or completion.

32. Assignment

32.1 The Operator shall not cede, assign, delegate or transfer any of its rights or obligations under the Agreement, or any part of it, or any benefit or interest therein, to any third party or Entity without the prior written consent of TransKarachi.

32.2 Notwithstanding anything to the contrary stated in this Agreement, TransKarachi shall be entitled, without requiring the consent of the Operator, to cede, assign, delegate or transfer any rights and/or obligations under this Agreement.

33. Waiver

33.1 Subject to Clause 33.2, no relaxation, forbearance or delay by a Party in enforcing the Agreement will prejudice, affect or restrict the rights, responsibilities, obligations, powers or remedies of that Party nor shall any waiver by either Party of any such rights, responsibilities, obligations, powers or remedies, or of any breach of the Agreement, be deemed to be a waiver of any other right, responsibility, obligation, power or remedy, or of any later or continuing breach of, the Agreement.

33.2 Any waiver of a Party’s rights, responsibilities, obligations, power or remedies arising out of, under or in connection with the Agreement shall be in writing, dated and signed by the representative of the Party granting such waiver, and shall specify the right, responsibility, obligation, power or remedy and the extent to which it is being waived. No waiver of a breach of a term of the Agreement operates as a waiver of any other breach of that term, or of a breach of any other term, of the Agreement.

34. Costs

34.1 Any costs, including all legal costs on an attorney and own client basis and taxes, incurred by a Party arising out of or in connection with a breach by another Party shall be borne by the Party in breach.

Signed on …………………. 2019

Witnesses

for TransKarachi

....

....

duly authorised and warranting such

Name: ....

Position:______________________________

Signed on …………………. 2019

Witnesses

for [BRT Company]

....

....

duly authorised and warranting such [ ]

Name: ....

Position:______________________________

ANNEX A

DEFINITIONS AND INTERPRETATION

1. Definitions

1.1 In the Agreement, the following words and expressions shall have the meanings set out below:

1.1.1 "**Abandon**" means wholly or substantially cease to carry out the Services for ten (10) consecutive days or during thirty (30) days (whether consecutive or not) in any year, except when relieved of the obligation to do so by the express provisions of this Agreement;

1.1.2 "**Agreement**" means this agreement as amended from time to time and including the Annexes;

1.1.3 "**Annexes**" means the annexes attached to this Agreement;

1.1.4 "**Applicable Law**" means any constitution, statute, ordinance, treaty, decree, proclamation or subordinated legislation or other legislative measure, as amended from time to time, including all national and provincial statutes and legislation and all municipal by-laws, as well as the common law and customary law and any judgment, decision, order or rule of any court or tribunal with relevant jurisdiction and any decision made by judicial or administrative bodies in accordance with any of the aforegoing;

1.1.5 "**Authorised Representatives**" means persons authorised in writing by TransKarachi and the Operator respectively pursuant to the BRT Vehicle Operator Agreement;

1.1.6 "**BRT Vehicle Operator Agreement**" means the agreement made on [•] 2019 between the Parties whereby the Operator agreed to operate and maintain the BRT vehicles provided by TransKarachi;

1.1.7 "**Business Day**" means any day other than a Saturday, Sunday or public holiday in Pakistan;

1.1.8 "**Change in Law**" means:

(a) the adoption of a new Law; or

(b) a change in or repeal of a existing Law,

which after the Effective Date results in:

(a) a change in the taxes, duties or levies payable by the Operator in respect of the Property Use; or

(b) a change in or the repeal of any other requirement for the performance of the obligations under this Agreement;

1.1.9 "**Commencement Date**" means the date indicated as the Commencement Date in the service notice given to the Operator by TransKarachi in accordance with clause 1.3 of the BRT Operator Agreement;

1.1.10 "**Confidential Information**" means all information, without limitation, of whatsoever nature:

(a) relating to the Disclosing Party's business, operations, processes, drawings, sketches, plans, models, product information, know-how, market opportunities, customers and business affairs;

(b) relating to the relationship of the Disclosing Party with its customers and suppliers; or

(c) relating to the contents of this Agreement and any other information received pursuant to this Agreement,

but excludes information which:

(a) is required to be disclosed under any law or regulation, or by any Regulatory Body, including any stock exchange on which a Receiving Party may be listed, provided that the Receiving Party in question shall first consult with the Disclosing Party before making any such disclosure, statement or announcement; or

(b) is in the public domain or enters into the public domain in any way, provided that the entry of such information into the public domain did not entail a breach of this Agreement by the Receiving Party; or

(c) the Receiving Party can show it was within its possession or knowledge, such information being in its use or having been recorded in its files, computers or other recording media, prior to receipt thereof from the Disclosing Party and which information was not previously acquired by the Receiving Party under any obligations of confidence or unlawfully; or

(d) is disclosed by the Receiving Party with the prior written approval of the Disclosing Party; or

(e) was disclosed by the Disclosing Party to a third party without restriction on disclosure or use, including without limitation, by way of a patent specification; or

(f) is hereafter disclosed or made available in good faith to the Receiving Party from a source other than the Disclosing Party, without breach by the Receiving Party of any obligation of confidentiality or non-use owed to the Disclosing Party or without breach by such other source who, to the knowledge of the Disclosing Party, is not subject to an obligation of confidentiality or non-use owed to the Disclosing Party; or

(g) is developed independently by the Receiving Party without reference to the Confidential Information;

1.1.11 "**Construction Company**" means any contractor engaged by TransKarachi to design and construct the Depot or the Staging Area or any other building or structure at the Property;

1.1.12 "**Depot**" means the immovable properties utilised by the Operator as a depot for the Vehicles, together with such fixtures and fittings as described in the BRT Vehicle Operator Agreement, or as otherwise authorised by TransKarachi and shall, for the avoidance of doubt, include a depot provided by TransKarachi and a Staging Area, depending on the context;

1.1.13 "**Depot Equipment**" means all equipment installed in the Depot, including electricity charging facilities, power supply system, and equipment handed over for use of depot/bus operations;

1.1.14 "**Disclosing Party**" means the Party disclosing Confidential Information to the Receiving Party;

1.1.15 "**Effective Date**" means when this Agreement has been signed by each Party, the latest of the dates upon which this Agreement was signed by any Party;

1.1.16 "**Entity**" means any natural or juristic person, association, business, close corporation, company, concern, enterprise, firm, partnership, limited partnership, joint venture, trust, undertaking, voluntary association, body corporate and any similar entity;

1.1.17 "**Month**" or "**Monthly**" means a calendar month;

1.1.18 "**Party**" means a party to this Agreement;

1.1.19 "**Performance Guarantee**" means the unconditional, irrevocable on-demand performance guarantee provided by the Operator to TransKarachi in accordance with the BRT Vehicle Operator Agreement;

1.1.20 "**Prohibited Act**" means:

(h) offering, giving or agreeing to give to a Public Official a gift or consideration of any kind as an inducement or reward for:

(i) doing or not doing (or for having done or not having done) any act; or

(ii) showing or not showing (or for having shown or not shown) favour or disfavour to any person,

in relation to the award or performance of the Agreement or any other agreement with TransKarachi; or

(i) entering into an agreement for which commission has been paid or has been agreed to be paid by the Operator or on its behalf, or to its knowledge, unless before the relevant agreement is entered into, particulars of any such commission and of the terms of any such agreement for the payment thereof have been disclosed in writing to TransKarachi; or

(j) committing any offence under the Applicable Law creating offences in respect of fraudulent acts; or

(k) defrauding, attempting to defraud or conspiring to defraud TransKarachi;

1.1.21 "**Property**" means plots of land no. [•] and [•] located in [•] to be utilised by the Operator as a Depot and the Staging Area, together with all buildings, structures and equipment erected or installed thereon;

1.1.22 "**Public Official**" means an official or employee of a government owned or controlled enterprise or any Regulatory Body and shall include any individual defined as a public official in an Applicable Law;

1.1.23 "**Quarter**" or "**Quarterly**" means a consecutive period of three (3) Months commencing from the start of a Financial Year or calendar year, as the case may be;

1.1.24 "**Receiving Party**" means the Party receiving Confidential Information from the Disclosing Party;

1.1.25 “**Regulatory Body**” means any governmental, semi-governmental, administrative, fiscal or judicial ministry, department, commission, authority, tribunal, agency, municipality or body, and shall include the provider of electricity, gas, water, wastewater, telecoms and other such public services, and any body with a regulatory function under the Applicable Law;

1.1.26 “**Reserve Fund**” means the fund established as a security under the BRT Vehicle Operator Agreement;

1.1.27 “**Service**” or “**Services**” means the public transport services to convey passengers and any other services to be rendered by the Operator pursuant to the BRT Vehicle Operator Agreement;

1.1.28 “**Staging Area**” means the staging area used by the Operator in the provision of the Services as described in the Operational Specifications Schedule, or as otherwise authorised by TransKarachi for temporary parking of BRT Vehicles in day and/or night time;

1.1.29 “**Surviving Provisions**” means Clauses 1 (*Preliminary Matters*); 9 (*Breach and Termination*); 10 - 34 (*Part D - Final Provisions*) and this Annex A;

1.1.30 “**Termination Date**” means the twelfth (12th) anniversary of the Commencement Date or the date on which an earlier termination pursuant to the terms of the Agreement takes effect;

1.1.31 “**Vehicles**” means vehicles as defined in the BRT Vehicle Operator Agreement.

2. Interpretation

2.1 In the Agreement:

2.1.1 in the event of conflict between the Annexes and the provisions of this Agreement (excluding the Annexes), the provisions of the Agreement shall prevail;

2.1.2 any definition in this Agreement, shall bear the same meaning and apply throughout this Agreement including Annexes hereto, unless otherwise stated or inconsistent with the context in which it appears;

2.1.3 the singular includes the plural and vice versa;

2.1.4 a reference to a statutory provision includes any subordinate legislation made from time to time under that provision and includes those provisions as amended, consolidated, re-enacted or replaced from time to time;

2.1.5 a reference to a document includes the document as modified from time to time and any document replacing it, in each case in the manner permitted by the Agreement;

2.1.6 a reference to a gender includes the other genders;

2.1.7 a reference to any government agency or body, if that agency or body ceases to exist or is reconstituted, renamed or replaced or has its powers or functions removed (“defunct body”), means the agency or body that performs most closely the functions of the defunct body;

2.1.8 a reference to an “agent” shall mean any person with a contractual relationship with a Party and carrying out activities or obligations on behalf of that Party;

2.1.9 a references to a “subsidiary” shall be a reference to a subsidiary as defined in the Companies Act, 2017;

2.1.10 references in this Agreement to “clauses” or to “Annexes”, are to clauses of and Annexes to this Agreement;

2.1.11 references to notices or requests made or received by any of the Parties shall, unless expressly provided otherwise in this Agreement, refer to notices or requests in writing;

2.1.12 references to “agree” or “agreed” shall require the agreement to be recorded in writing and signed by the authorised representatives of the Parties;

2.1.13 no rule of construction shall be applied to the disadvantage of a Party to this Agreement because that Party was responsible for or participated in the preparation of this Agreement or any part of it;

2.1.14 unless otherwise provided, any number of days prescribed shall be determined by excluding the first and including the last day or, where the last day falls on a day that is not a Business Day, the next succeeding Business Day;

2.1.15 references to day/s, month/s or year/s shall be construed as Gregorian calendar day/s, month/s or year/s, as the case may be;

2.1.16 if a definition imposes substantive rights and obligations on a Party, such rights and obligations shall be given effect to and shall be enforceable, notwithstanding that they are contained in a definition;

2.1.17 a reference to a Party includes that Party’s successors and permitted assigns;

2.1.18 the use of the word “including” followed by a specific example/s shall not be construed as limiting the meaning of the general wording preceding it and it shall be construed as if it were followed by “without being limited to”.

Annex-B – Tentative Layout of [...] Depot

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 - DRAFT CONTRACTS

OPERATOR CONTRACTS – ANNEX E

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

LEASE-TO-OWN AGREEMENT

(*To be printed on Judicial Stamp Paper of Prescribed Fee)*

between

[TransKarachi]

and

[*BRT Company*]

Date: [•]

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THIS LEASE-TO-OWN AGREEMENT (the “**Agreement**”) is made on [•] 2019

BETWEEN

1. **[TRANSKARACHI**, a company established under Section 42 of the Companies Act of 2017 with its office located at [•], Karachi, Pakistan (hereinafter referred to as “**TransKarachi**” which expression shall include its successors-in-interest and permitted assigns)] **TrasnKarachi**; and

2. <***Insert name of the BRT Company***>, a company incorporated in [•], with company registration no. [•] and whose registered address is at [•] (the “**Operator**”).

TransKarachi and the Operator are individually referred to herein as a “**Party**” and collectively as the “**Parties**”.

WHEREAS:

A. The Parties have entered into the BRT Vehicle Operator Agreement whereby it is one of the conditions precedent to execute this Agreement.

B. TransKarachi wishes to ensure that the Vehicles are properly maintained by the Operator and that the Operator is incentivised to carry out such maintenance to the Vehicles for the duration of the BRT Vehicle Operator Agreement.

C. TransKarachi requires the Operator to be the lessee of the Vehicles and eventual transfer of title at end of term of the Agreement, all in accordance with the terms and conditions of this Agreement.

NOW THE AGREEMENT PROVIDES:

PART A - GENERAL

1. Preliminary Matters

1.1 Definitions and Interpretation

1.1.1 The defined words and expressions set out in Clause 1 of Annex A (*Definitions and Interpretation*) hereof and the provisions relating to the construction and interpretation of the Agreement set out in Clause 2 of Annex A (*Definitions and Interpretation*) hereof shall apply to the Agreement.

1.2 Effect of this Agreement

1.2.1 The Parties hereby agree that this Agreement shall immediately be binding on them as of the Effective Date.

1.3 Conditions Precedent

1.3.1 If conditions precedent under the BRT Vehicle Operator Agreement remain unfulfilled (and/or are not waived) for an unreasonably long time (in the opinion of TransKarachi), then, save and except the Surviving Provisions, TransKarachi shall be entitled to consider this Agreement null and void *ab initio* and TransKarachi shall be discharged from any and all liability that may have arisen or that may arise under this Agreement.

PART B - LEASE OF THE VEHICLES

2. Lease

2.1 General

2.1.1 TransKarachi hereby leases to the Operator the Vehicles and the Operator hereby accepts the lease of the Vehicles for the [twelve (12) year] term commencing on the Commencement Date.

2.1.2 The Operator shall have the rights and obligations of a lessee to possess and use the Vehicles solely for the purposes expressly provided in the BRT Vehicle Operator Agreement and/or agreed in writing between the Parties.

2.1.3 The Operator shall maintain and operate the Vehicles in accordance with the BRT Vehicle Operator Agreement and any Applicable Laws, including environmental and health and safety regulations.

2.1.4 Subject to Clause 3 (*Transfer of Ownership Interest and Title to the Vehicles*) below, legal title to and ownership of the Vehicles shall remain with TransKarachi. The Operator shall not create or allow the creation of any Encumbrance in any manner of any or all of the Vehicles without the prior written consent of TransKarachi. The Operator shall not sublet the Vehicles or allow any third party to use them.

2.2 Lease Payments

2.2.1 The Operator shall be obliged to make the monthly lease payment for the lease of the Vehicles in the amount of PKR [1 per each 12-metre Vehicle and PKR 2 per each 18-metre Vehicle.]

2.2.2 The Operator shall make the lease payment at the times and in the manner specified in the Payment Calculation Schedule (which is part of the BRT Vehicle Operator Agreement) and the Fund Management Agreement.

2.2.3 Any amounts payable hereunder to TransKarachi by the Operator shall be set off against amounts payable by TransKarachi to the Operator under the BRT Vehicle Operator Agreement.

2.2.4 To the extent that the lease of the Vehicles pursuant to this Agreement is taxable, the Operator agrees to bear all taxes, charges, duties and/or tariffs by itself and, upon request from TransKarachi, provide proof that such obligations have been satisfied in full.

PART C - OWNERSHIP RIGHT TO THE VEHICLES

3. Transfer of Ownership Interest and Title to the Vehicles

3.1 The Operator agrees to purchase each Vehicle for the price of [PKR 144 for each 12-metre Vehicle and PKR 288 for each 18-metre Vehicle in a period of twelve (12) years]. Each lease payment made in accordance with Clause 2.1.4 above and the Payment Specification Schedule shall be credited towards the Operator's purchase of the Vehicles until the Vehicles Purchase Price of PKR [23472] has been paid in full.

3.2 Subject to the Operator paying the total Vehicles Purchase Price under this Agreement and provided this Agreement or the BRT Vehicle Operator Agreement is not terminated for any reason prior to its expiry, TransKarachi shall do all things necessary and execute all documents to transfer full title and interest to the Vehicles to the Operator. The Operator acknowledges that this transfer of title and interest to the Vehicles may be conditioned on the Operator's agreement to continue to operate the BRT service till end of BRT Vehicle Operator Agreement.

4. On-Board Units

4.1 For the avoidance of doubt, the Operator shall not acquire ownership of or any ownership interest in the On-board Units unless the Parties agree in writing otherwise. The ownership of the On-board Units shall remain with TransKarachi until such time as ownership of the Vehicle in which it is installed is legally transferred to the Operator (at which time the ownership of the installed On-Board Units shall also transfer to the Operator).

4.2 TransKarachi shall, in its sole discretion, be entitled to uninstall and/or remove the On-board Units from the Vehicles at any time at its own cost or leave them in the Vehicles after the term of this Agreement, in which case TransKarachi shall be discharged from any and all liability in relation to the On-board Units left in the Vehicles.

PART C - BREACH AND TERMINATION

5. Breach and Termination

5.1 If the Operator commits a material breach of this Agreement and fails to remedy the breach within ten (10) Business Days after receipt from TransKarachi of a notice calling upon it to do so or such other time as specified by TransKarachi or agreed by the Parties then TransKarachi shall be entitled, in addition to and without prejudice to any other right it may have under Applicable Law or in accordance with this Agreement, to seek specific performance of this Agreement or to terminate this Agreement forthwith on notice to the Operator and in either event, to recover such costs, losses and damages as it may have sustained.

5.2 For purposes of this Agreement, a material breach shall be if the Operator:

5.2.1 commits a material breach under the BRT Vehicle Operator Agreement; or

5.2.2 delegates, cedes or sub-contracts this Agreement or part thereof in contravention of the provisions hereof without having obtained TransKarachi’s prior written consent;

5.2.3 fails to make the lease payments under this Agreement and/or the Payment Specification Schedule;

5.2.4 allows any third party to use and/or operate any of the Vehicles without the express written consent of TransKarachi; or

5.2.5 consistently fails to observe any provision of this Agreement (despite being given notice in relation thereto).

5.3 If TransKarachi commits a material breach of this Agreement and/or the BRT Vehicle Operator Agreement and fails to remedy the breach within thirty (30) Business Days after receipt from the Operator calling upon it to do so then the Operator shall be entitled, in addition to and without prejudice to any other right it may have under Applicable Law or under the terms of this Agreement, to seek specific performance of the terms of this Agreement or to terminate this Agreement upon sixty (60) days notice to TransKarachi and in either event, to recover such costs, losses and damages as it may have sustained.

5.4 In the event of termination of this Agreement in accordance with Clause 5.1:

5.4.1 TransKarachi shall be entitled to immediately take possession of the Vehicles and the Operator shall be required to do all things necessary to ensure peaceful and orderly transfer of the Vehicles to TransKarachi, including returning to TransKarachi all keys, access cards and documents relating to each Vehicle; and

5.4.2 the Operator shall not be entitled to any payments from TransKarachi, including the return of any lease payments already made by the Operator to TransKarachi under the Agreement; and

5.4.3 the Operator shall promptly cause the necessary repair to the Vehicles at the Operator's own expense, failing which TransKarachi shall have the right to either claim specific performance and/or set-off any repair costs from any payment due to the Operator, within TransKarachi's sole discretion.

5.5 In the event of termination of this Agreement in accordance with Clause 5.3:

5.5.1 TransKarachi shall be entitled to immediately take possession of the Vehicles and the Operator shall be required to do all things necessary to ensure peaceful and orderly transfer of the Vehicles to TransKarachi including returning to TransKarachi all keys, access cards and documents relating to each Vehicle; and

5.5.2 TransKarachi shall forthwith return to the Operator all lease amounts paid by the Operator to TransKarachi under the Agreement; and

5.5.3 the Operator shall promptly cause the necessary repair to the Vehicles at the Operator's own expense, failing which TransKarachi shall have the right to either claim specific performance and/or set-off any repair costs from any payment due to the Operator, within TransKarachi's sole discretion.

5.6 In addition to and without prejudice to any other right TransKarachi may have under Applicable Law or under the terms of this Agreement and/or the BRT Vehicle Operator Agreement, in the event the Operator remains in possession of the Vehicles for any period after its early termination, the Operator shall be obliged to pay to TransKarachi a monthly holdover payment in the amount of [PKR 120,000 per each 12-metre Vehicle and PKR 208,000 per each 18-metre Vehicle.]

PART D - MISCELLANEOUS MATTERS

6. Disputes

6.1 For the purposes of this Clause 6, the term “dispute” shall be interpreted in its widest sense and shall include any dispute or difference in connection with or in respect of the conclusion or existence of this Agreement, the carrying into effect of this Agreement, the interpretation or application of the provisions of this Agreement, the Parties’ respective rights and obligations in accordance with and arising out of this Agreement or the validity, enforceability, rectification, termination or cancellation, whether in whole or in part, of this Agreement.

6.2 Save as otherwise provided for in this Agreement, any dispute between the Parties arising in connection with this Agreement shall be resolved in accordance with the provisions of clause 39 (*Dispute resolution*) of the BRT Vehicle Operator Agreement.

7. Vehicle insurance

7.1 The Operator shall effect and maintain relevant Vehicle insurance in accordance with the BRT Vehicle Operator Agreement.

8. Indemnity

8.1 The Operator shall indemnify and hold harmless TransKarachi and its personnel against and from all liabilities, claims, damages, loss, expenses and costs (including legal fees and expenses) which arise out of or in relation to any liabilities, claims, damages, loss, expenses or costs (including legal fees and expenses) incurred by third parties on account of the Operator’s use of the Property or Operator’s breach of any of its obligations under this Agreement.

9. Periodic review of the Agreement

9.1 In view of the long-term nature of this Agreement and in order to provide a continuous means for the assessment of:

9.1.1 TransKarachi’s contract management systems;

9.1.2 various aspects of the relationship between the Parties which would allow for inter alia an improvement in conflict resolution and the sharing of information between the Parties,

the Operator acknowledges that TransKarachi will review the provisions of this Agreement every three (3) years for the duration of this Agreement.

9.2 To the extent that TransKarachi wishes to propose any amendment to this Agreement pursuant to such review, such proposal shall be discussed and considered in good faith, but shall not be of any force or effect unless reduced to writing and signed by or on behalf of both Parties. For the avoidance of doubt, should the Parties fail to reach agreement as provided for in this Clause 8, such failure shall not constitute a dispute as contemplated in Clause 6 (*Disputes*).

10. Addresses and notices

10.1 All notices under this Agreement shall be made by the Parties in accordance with clause 49 (*Addresses and notices*) of the BRT Vehicle Operator Agreement.

11. Change in Law

11.1 The Operator acknowledges and agrees that it shall take full risk and responsibility for a Change in Law occurring. Notwithstanding the foregoing, if a Change in Law occurs or is imminent that affects the rights and obligations of the Operator under this Agreement, the Operator shall notify TransKarachi within fourteen (14) days of the date of such Change in Law occurring or (if earlier) coming to the attention of the Operator and the Parties shall discuss the effects of the Change in Law and endeavour to arrive at a resolution.

11.2 Any resolution reached between the Parties shall be recorded in writing and such record shall be signed by both Parties.

12. Remedies

12.1 No remedy conferred by this Agreement is intended to be exclusive of any other remedy which is otherwise available at law, by statute or otherwise. Each remedy shall be cumulative and in addition to every other remedy given hereunder or now or hereafter existing at law, by statute or otherwise. The election of any one or more remedy by any of the Parties shall not constitute a waiver by such Party of the right to pursue any other remedy.

13. Confidentiality

13.1 Each Party shall at all times keep in confidence the Confidential Information of the other Party which it may acquire for the purposes of or in connection with this Agreement (whether prior to or after the Commencement Date) and shall not use or permit the use of such Confidential Information and shall procure that its employees shall not use the Confidential Information, for any other purpose and shall not disclose such Confidential Information to any third party.

13.2 Notwithstanding Clause 13.1, a Party may disclose the Confidential Information of the other Party to such former Party’s employees or Authorised Representatives to the extent that such employees or Authorised Representatives need to know the Confidential Information and shall ensure that such employees or Authorised Representatives are aware of and comply with, the confidentiality obligations contained in this Clause 13.

13.3 Each Party shall take all such steps as may be reasonably necessary to prevent the Confidential Information of the other Party from falling into the hands of an unauthorised third party.

13.4 The Operator shall not make any comments to the media relating to this Agreement and any related matter nor shall it respond to any queries from the media without the prior written approval of TransKarachi.

14. Severance

14.1 In the event that any provision of the Agreement is held by any judicial or other competent authority to be illegal, invalid or unenforceable that provision shall be severed to the extent necessary to make the Agreement enforceable, and it shall not affect or impair the validity, legality or enforceability of any of the other provisions of the Agreement.

15. No agency

15.1 No provision of this Agreement shall be construed as constituting an agency, partnership, or joint venture between the Parties and neither Party shall have any express or implied TransKarachi to bind the other Party in any way or to represent the other Party unless specifically provided to the contrary in this Agreement, and, for the avoidance of doubt, this Clause 15 shall not affect or otherwise derogate from the obligations and powers of the Operator in relation to handing over of the Vehicles to other authorised parties as contemplated in this Agreement.

15.2 The Operator is an independent contractor performing the Agreement. The Operator is not an employee or agent of TransKarachi.

16. Corruption and Fraud

16.1 The Operator warrants that in entering into the Agreement it has not committed any Prohibited Act.

16.2 In the event that the Operator is contacted by a Public Official requesting or suggesting that the Operator act in a manner which would constitute a Prohibited Act, the Operator shall immediately provide TransKarachi in writing with full details of the request (including the identity of the Public Official making the request).

16.3 Without prejudice to Clause 16.2, the Operator shall ensure that its staff undertaking activities in connection with the Agreement are subject to similar obligations to those set out in this Clause 166 and the Operator shall enforce such obligations.

16.4 In the event that the Operator fails to comply with the requirements of this Clause 166 TransKarachi shall be entitled to terminate the Agreement pursuant to Clause 5 (*Breach and Termination*).

17. Entire Agreement

17.1 This Agreement constitutes the entire agreement between the Parties in relation to all matters contained herein, including all understandings, rights, responsibilities, duties and obligations and supersedes all prior arrangements, representations, communications, negotiations, agreements and contracts (whether written or oral) made between or entered into by the Parties with respect thereto prior to the Effective Date. None of the Parties shall have any claim or right of action arising from any undertaking, representation or warranty not included in this Agreement.

18. No stipulation for the benefit of a third person

18.1 Save as is expressly provided for in this Agreement, no provision of this Agreement constitutes a stipulation for the benefit of a third person which, if accepted by the person, would bind any Party in favour of that person.

19. No representations

19.1 A Party may not rely on any representation which allegedly induced that Party to enter into this Agreement, unless the representation is provided in this Agreement.

20. Amendment

20.1 Except as set out elsewhere in this Agreement, no modification, amendment, addendum or variation to the accordance with the Agreement shall be effective or binding, unless it:

20.1.1 is made in writing; and

20.1.2 expressly sets out the modification, amendment, addendum or variation to the accordance with the Agreement; and

20.1.3 refers to the Agreement; and

20.1.4 is signed and dated by a representative of each Party.

21. Indulgences

21.1 The grant of any indulgence, extension of time or relaxation of any provision by a Party under this Agreement shall not constitute a waiver of any right by the grantor or prevent or adversely affect the exercise by the grantor of any existing or future right of the grantor.

22. General co-operation

22.1 The Parties shall co-operate with each other and shall each execute and deliver to the other Party such other instruments and documents and take such other actions as may be reasonably requested from time to time in order to carry out, evidence and confirm their rights and the intended purpose of this Agreement.

23. Governing law

23.1 This Agreement is to be governed, interpreted and construed in accordance with the laws of the Islamic Republic of Pakistan.

24. Language

24.1 Unless expressly notified in advance by TransKarachi, the primary language of the Agreement shall be English. All documents and communications issued between the Parties shall be in English. Unless expressly notified in advance by TransKarachi, all minutes of meetings shall be issued in English.

25. Independent advice

25.1 Each of the Parties hereby respectively agrees and acknowledges that:

25.1.1 it has been free to secure independent legal advice as to the nature and effect of each provision of this Agreement and that it has either taken such independent legal advice or has dispensed with the necessity of doing so; and

25.1.2 each provision of this Agreement (and each provision of the Annexes) is fair and reasonable in all the circumstances and is part of the overall intention of the Parties in connection with this Agreement.

26. Good faith

26.1 The Parties shall, at all times, act in good faith towards each other and shall not bring the other Party into disrepute.

27. Survival of rights, duties and obligations

27.1 The Surviving Provisions will survive termination or completion of the Agreement.

27.2 In the event that the Agreement is terminated or completed, neither Party shall be liable to the other Party except:

27.2.1 under the Surviving Provisions; or

27.2.2 in respect of any breach of the Agreement occurring before such termination or completion; or

27.2.3 any rights or liabilities between the Parties that were pre-existing as at the date of termination or completion.

28. Assignment

28.1 The Operator shall not cede, assign, delegate or transfer any of its rights or obligations under the Agreement, or any part of it, or any benefit or interest therein, to any third party or Entity without the prior written consent of TransKarachi.

28.2 Notwithstanding anything to the contrary stated in this Agreement, TransKarachi shall be entitled, without requiring the consent of the Operator, to cede, assign, delegate or transfer any rights and/or obligations under this Agreement.

29. Waiver

29.1 Subject to Clause 29.2, no relaxation, forbearance or delay by a Party in enforcing the Agreement will prejudice, affect or restrict the rights, responsibilities, obligations, powers or remedies of that Party nor shall any waiver by either Party of any such rights, responsibilities, obligations, powers or remedies, or of any breach of the Agreement, be deemed to be a waiver of any other right, responsibility, obligation, power or remedy, or of any later or continuing breach of, the Agreement.

29.2 Any waiver of a Party's rights, responsibilities, obligations, power or remedies arising out of, under or in connection with the Agreement shall be in writing, dated and signed by the representative of the Party granting such waiver, and shall specify the right, responsibility, obligation, power or remedy and the extent to which it is being waived. No waiver of a breach of a term of the Agreement operates as a waiver of any other breach of that term, or of a breach of any other term, of the Agreement.

30. Costs

30.1 Any costs, including all legal costs on an attorney and own client basis and taxes, incurred by a Party arising out of or in connection with a breach by another Party shall be borne by the Party in breach.

Signed on …………………. 2019

Witnesses

for TransKarachi

....

....

duly authorised and warranting such

Name: ....

Position:______________________________

Signed on …………………. 2019

Witnesses

for [BRT Company]

....

....

duly authorised and warranting such [ ]

Name: ....

Position:______________________________

ANNEX A

DEFINITIONS AND INTERPRETATION

1. Definitions

1.1 In the Agreement, the following words and expressions shall have the meanings set out below:

1.1.1 "**Agreement**" means this agreement as amended from time to time and including the Annexes;

1.1.2 "**Annexes**" means the annexes attached to this Agreement;

1.1.3 "**Applicable Law**" means any constitution, statute, ordinance, treaty, decree, proclamation or subordinated legislation or other legislative measure, as amended from time to time, including all national and provincial statutes and legislation and all municipal by-laws, as well as the common law and customary law and any judgment, decision, order or rule of any court or tribunal with relevant jurisdiction and any decision made by judicial or administrative bodies in accordance with any of the aforegoing;

1.1.4 "**Authorised Representatives**" means persons authorised in writing by TransKarachi and the Operator respectively pursuant to the BRT Vehicle Operator Agreement;

1.1.5 "**BRT System**" means the bus rapid transit system in Karachi included in the Project;

1.1.6 "**BRT Vehicle Operator Agreement**" means the agreement made on [•] 2019 between the Parties whereby the Operator agreed to operate and maintain the Vehicles provided by TransKarachi;

1.1.7 "**Business Day**" means any day other than a Saturday, Sunday or public holiday in Pakistan;

1.1.8 "**Change in Law**" means:

(a) the adoption of a new Law; or

(b) a change in or repeal of a existing Law,

which after the Effective Date results in:

(a) a change in the taxes, duties or levies payable by the Operator in respect of the lease of the Vehicles; or

(b) a change in or the repeal of any other requirement for the performance of the obligations under this Agreement;

1.1.9 "**Commencement Date**" means the date being the later of (a) date indicated as the Commencement Date in the service notice given to the Operator by TransKarachi in accordance with clause 1.3 of the BRT Operator Agreement, and (b) the Effective Date;

1.1.10 "**Confidential Information**" means all information, without limitation, of whatsoever nature:

(a) relating to the Disclosing Party's business, operations, processes, drawings, sketches, plans, models, product information, know-how, market opportunities, customers and business affairs;

(b) relating to the relationship of the Disclosing Party with its customers and suppliers; or

(c) relating to the contents of this Agreement and any other information received pursuant to this Agreement,

but excludes information which:

(a) is required to be disclosed under any law or regulation, or by any Regulatory Body, including any stock exchange on which a Receiving Party may be listed, provided that the Receiving Party in question shall first consult with the Disclosing Party before making any such disclosure, statement or announcement; or

(b) is in the public domain or enters into the public domain in any way, provided that the entry of such information into the public domain did not entail a breach of this Agreement by the Receiving Party; or

(c) the Receiving Party can show it was within its possession or knowledge, such information being in its use or having been recorded in its files, computers or other recording media, prior to receipt thereof from the Disclosing Party and which information was not previously acquired by the Receiving Party under any obligations of confidence or unlawfully; or

(d) is disclosed by the Receiving Party with the prior written approval of the Disclosing Party; or

(e) was disclosed by the Disclosing Party to a third party without restriction on disclosure or use, including without limitation, by way of a patent specification; or

(f) is hereafter disclosed or made available in good faith to the Receiving Party from a source other than the Disclosing Party, without breach by the Receiving Party of any obligation of confidentiality or non-use owed to the Disclosing Party or without breach by such other source who, to the knowledge of the Disclosing Party, is not subject to an obligation of confidentiality or non-use owed to the Disclosing Party; or

(g) is developed independently by the Receiving Party without reference to the Confidential Information;

1.1.11 "**Disclosing Party**" means the Party disclosing Confidential Information to the Receiving Party;

1.1.12 "**Effective Date**" means when this Agreement has been signed by each Party, the latest of the dates upon which this Agreement was signed by any Party;

1.1.13 "**Encumbrance**" means:

(a) any mortgage, pledge, lien, assignment or cession conferring security, hypothecation, security interest, preferential right or trust arrangement or other encumbrance securing any obligation of any person or any other charge (whether equitable or otherwise) of whatsoever nature or howsoever described; or

(b) any arrangement under which money or claims to, or for the benefit of, a bank or other account may be applied, set off or made subject to a combination of accounts so as to effect discharge of any sum owed or payable to any person; or

(c) any other type of preferential agreement or arrangement (including any title transfer and retention arrangement), the effect of which is the creation of a security interest;

1.1.14 "**Entity**" means any natural or juristic person, association, business, close corporation, company, concern, enterprise, firm, partnership, limited partnership, joint venture, trust, undertaking, voluntary association, body corporate and any similar entity;

1.1.15 "**Month**" or "**Monthly**" means a calendar month;

1.1.16 "**On-board Units**" means any unit installed on the Vehicle by TransKarachi (excluding third party appointed by TransKarachi other than Bus supplier) in accordance with the BRT Vehicle Operator Agreement;

1.1.17 "**Party**" means a party to this Agreement;

1.1.18 "**Prohibited Act**" means:

(a) offering, giving or agreeing to give to a Public Official a gift or consideration of any kind as an inducement or reward for:

(i) doing or not doing (or for having done or not having done) any act; or

(ii) showing or not showing (or for having shown or not shown) favour or disfavour to any person,

in relation to the award or performance of the Agreement or any other agreement with TransKarachi; or

(b) entering into an agreement for which commission has been paid or has been agreed to be paid by the Operator or on its behalf, or to its knowledge, unless before the relevant agreement is entered into, particulars of any such commission and of the terms of any such agreement for the payment thereof have been disclosed in writing to TransKarachi; or

(c) committing any offence under the Applicable Law creating offences in respect of fraudulent acts; or

(d) defrauding, attempting to defraud or conspiring to defraud TransKarachi;

1.1.19 ["**Project**" means the Karachi Bus Rapid Transit (BRT) Red Line Project carried out by TransKarachi;][1]

1.1.20 "**Public Official**" means an official or employee of a government owned or controlled enterprise or any Regulatory Body and shall include any individual defined as a public official in an Applicable Law;

1.1.21 "**PKR**" means Pakistani rupee;

1.1.22 "**Receiving Party**" means the Party receiving Confidential Information from the Disclosing Party;

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[1] ***DWF comment**: TBC.*

1.1.23 "**Regulatory Body**" means any governmental, semi-governmental, administrative, fiscal or judicial ministry, department, commission, authority, tribunal, agency, municipality or body, and shall include the provider of electricity, gas, water, wastewater, telecoms and other such public services, and any body with a regulatory function under the Applicable Law.

1.1.24 "**Surviving Provisions**" means clauses 1 (*Preliminary Matters*); 5 (*Breach and Termination*); 6 - 29 (*Part D - Final Provisions*) and this Annex A;

1.1.25 "**Vehicles**" means the vehicles defined in the BRT Vehicle Operator Agreement including any tools and equipment for the vehicles supplied by TransKarachi in accordance with the BRT Vehicle Operator Agreement;

1.1.26 "**Vehicles Purchase Price**" means the total price to be paid by the Operator for all of the Vehicles, which shall be subject to change to account for the addition or withdrawal of Vehicles to the fleet.

2. Interpretation

2.1 In the Agreement:

2.1.1 in the event of conflict between the Annexes and the provisions of this Agreement (excluding the Annexes), the provisions of the Agreement shall prevail;

2.1.2 any definition in this Agreement, shall bear the same meaning and apply throughout this Agreement including Annexes hereto, unless otherwise stated or inconsistent with the context in which it appears;

2.1.3 the singular includes the plural and vice versa;

2.1.4 a reference to a statutory provision includes any subordinate legislation made from time to time under that provision and includes those provisions as amended, consolidated, re-enacted or replaced from time to time;

2.1.5 a reference to a document includes the document as modified from time to time and any document replacing it, in each case in the manner permitted by the Agreement;

2.1.6 a reference to a gender includes the other genders;

2.1.7 a reference to any government agency or body, if that agency or body ceases to exist or is reconstituted, renamed or replaced or has its powers or functions removed ("defunct body"), means the agency or body that performs most closely the functions of the defunct body;

2.1.8 a reference to an "agent" shall mean any person with a contractual relationship with a Party and carrying out activities or obligations on behalf of that Party;

2.1.9 a reference to a "subsidiary" shall be a reference to a subsidiary as defined in the Companies Act, 2017;

2.1.10 references in this Agreement to "clauses" or to "Annexes", are to clauses of and Annexes to this Agreement;

2.1.11 references to notices or requests made or received by any of the Parties shall, unless expressly provided otherwise in this Agreement, refer to notices or requests in writing;

2.1.12 references to “agree” or “agreed” shall require the agreement to be recorded in writing and signed by the authorised representatives of the Parties;

2.1.13 no rule of construction shall be applied to the disadvantage of a Party to this Agreement because that Party was responsible for or participated in the preparation of this Agreement or any part of it;

2.1.14 unless otherwise provided, any number of days prescribed shall be determined by excluding the first and including the last day or, where the last day falls on a day that is not a Business Day, the next succeeding Business Day;

2.1.15 references to day/s, month/s or year/s shall be construed as Gregorian calendar day/s, month/s or year/s, as the case may be;

2.1.16 if a definition imposes substantive rights and obligations on a Party, such rights and obligations shall be given effect to and shall be enforceable, notwithstanding that they are contained in a definition;

2.1.17 a reference to a Party includes that Party’s successors and permitted assigns;

2.1.18 the use of the word “including” followed by a specific example/s shall not be construed as limiting the meaning of the general wording preceding it and it shall be construed as if it were followed by “without being limited to”.

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 - DRAFT CONTRACTS

OPERATOR CONTRACTS – ANNEX F

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

Annex F

PERFORMANCE GUARANTEE

(*To be printed on Judicial Stamp Paper of Prescribed Fee*)

[TO BE ISSUED ON JUDICIAL PAPER OF PRESCRIBED FEE BY BANK LICENSED TO CONDUCT BUSINESS IN THE ISLAMIC REPUBLIC OF PAKISTAN]

This **Performance Guarantee No.** <*Insert No.*> is made on <*Insert date*> 2019 (the "**Guarantee**")

Ref: BRT Vehicle Operator Agreement dated <*Insert date*> 2019 (the "**Agreement**")

Beneficiary: [TransKarachi, a company established under Section 42 of the Companies Act of 2017 with its office located at [•], Karachi, Pakistan ("**TransKarachi**" which expression shall include its successors-in-interest and permitted assigns).]

1. GUARANTEE

1.1 We <*Insert name of Bank*> Bank (the "**Guarantor**") have been informed that <*Insert name of the BRT Company*> (the "**Operator**") has been awarded the Agreement relating to the operation and maintenance services of the vehicles as part of the Karachi Sustainable BRT Corridor System (the "**Project**").

1.2 The Guarantor hereby irrevocably and unconditionally undertakes to pay to TransKarachi on its first demand for payment, without regard to any objections or defences to TransKarachi's demand from the Operator or any other person, an amount or amounts not exceeding in total PKR [500,000,000 (five hundred million Pakistani rupees).]

2 TIME FOR PAYMENT

2.1 Any amount demanded by TransKarachi shall be paid by Guarantor to TransKarachi within one (1) calendar day of receipt of the TransKarachi's demand for payment stating that the Operator is in breach of its obligations arising under, out of or in connection with the Agreement and the Guarantor shall have neither the right nor the duty or obligation to challenge the accuracy or sufficiency of such statement or the amount specified in the demand.

3 VALIDITY OF GUARANTEE

3.1 This Guarantee shall come into force on the date hereof and shall remain valid until <*insert date*> whereupon this Guarantee shall expire and be returned to the Guarantor.

4 PAYMENT FREE OF DEDUCTIONS AND WITHHOLDINGS

4.1 Any payment under this Guarantee shall be made free and clear of, and without deduction for or on account of, any present or future taxes, levies, imposts, duties, charges, fees, deductions or withholdings of any nature whatsoever and by whomsoever imposed.

5 Notices and Demands for Payment

5.1 Any demand for payment made under this Guarantee shall be delivered by hand or registered courier and be deemed to be duly made at the time of, and on the date of, delivery.

5.2 Any notice given under this Guarantee shall be deemed to be duly given:

A. in the case of facsimile transmission, on the date and at the time shown on the transmission report by the machine from which the facsimile was sent, subject to the machine producing a report that the facsimile was sent in its entirety to the contact details of the addressee stated in Schedule 1 (the "**Contact Details**"); and

B. in the case of email:

  (A) at the time of receipt by the sender of an email acknowledgement from the intended addressee's information system showing that the email has been delivered to the email address of that addressee; or

  (B) if no email acknowledgement is received, then at the time the email enters an information system which is under the control of the intended addressee (and the addressee shall make available at the request of the sender, evidence of such time); and

C. in the case of delivery by hand or registered courier, at the time of and on the date of delivery.

5.3 Any notice or demand given or made by TransKarachi or the Guarantor relating to this Guarantee shall be in English.

6 ASSIGNMENT

6.1 TransKarachi shall have the right to assign the rights and benefits under this Guarantee.

7 DISPUTE RESOLUTION

7.1 This Guarantee shall be governed by, interpreted and construed in accordance with the laws of the Islamic Republic of Pakistan. Each Party consents to the jurisdiction of the courts in the Islamic Republic of Pakistan.

EXECUTED for and on behalf of
[*GUARANTOR***]**

……………………………………………

(signed)

……………………………………………

Name

Witnesses:

SCHEDULE TO THE PERFORMANCE GUARANTEE

For TransKarachi:
TrasnKarachi
<*Address line1*>
<*Address line2*>
<*Address line3*>
Tel: <*Insert TPC’s telephone number*>
Fax: <*Insert TPC’s fax number*>
Email: <*Insert TPC’s email address*>
For the Attention of <____________________>

For the Guarantor:
<*Insert Guarantor’s Name*>
<*Address line1*>
<*Address line2*>
<*Address line3*>
Tel: <*Insert Guarantor’s telephone number*>
Fax:<*Insert Guarantor’s fax number*>
Email:<*Insert Guarantor’s email address*>
For the Attention of <____________________>

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 - DRAFT CONTRACTS

OPERATOR CONTRACTS – ANNEX G

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

Annex G

PARENT COMPANY GUARANTEE

(*To be printed on Judicial Stamp Pape of Prescribed Fee*)

<*Insert name of Parent Company*>

(GUARANTOR)

IN FAVOUR OF

[TRANSKARACHI]

PARENT COMPANY GUARANTEE

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THIS PARENT COMPANY GUARANTEE (the “**Guarantee**”) is made on <*Insert date*> 2019

BETWEEN:

(1) **TRANSKARACHI**, a statutory body established under The Sindh Mass Transit Act, 2016 with its office located at [•], Karachi, Pakistan (“**TransKarachi**" which expression shall include its successors-in-interest and permitted assigns)]; and

(2) <***Insert name of the Parent Company***>, a company incorporated in [•], with company registration no. [•] and whose registered address is at [•] (the “**Guarantor**”).

TransKarachi and the Guarantor are individually referred to herein as a “**Party**” and collectively as the “**Parties**”.

WHEREAS:

A. <*Insert name of the BRT Company*> (the “**Operator**”) has been awarded by TransKarachi an agreement relating to the operation and maintenance services of the vehicles as part of the Karachi Sustainable BRT Corridor System (the “**Agreement**”).

B. The Operator is a <*State relationship with the Guarantor (branch, subsidiary, affiliate or other relationship*)> of the Guarantor] / [The Operator is an Association of Persons and <*Insert name of member of Operator* > (the “**Member**”) is a <*State relationship with the Guarantor (branch, subsidiary, affiliate or other relationship*)> of the Guarantor.]

C. Under the Agreement, the Operator is required to procure a parent company guarantee from its parent company to guarantee the Operators’ performance of its duties and obligations arising under, out of or in connection with the Agreement.

D. The Guarantee is being delivered by the Operator to TransKarachi in fulfilment of the Operator’s obligation to deliver a parent company guarantee to TransKarachi under the Agreement.

E. The Agreement is entered into by TransKarachi in reliance upon the undertakings of the Guarantor to TransKarachi contained in the Guarantee.

NOW THE GUARANTEE PROVIDES:

1. PRELIMINARY MATTERS

1.1 Definitions and Interpretation

1.1.1 The defined words and expressions set out in Clause 1 of Appendix 1 (*Definitions and Interpretation*) and the provisions relating to the construction and interpretation of the Guarantee set out in Clause 2 of Appendix 1 (*Definitions and Interpretation*) shall apply to the Guarantee.

2. GUARANTEES AND INDEMNITIES

2.1 Guaranteed Obligations

2.1.1 The Guarantor irrevocably and unconditionally guarantees the performance and discharge by the Operator of the Guaranteed Obligations at the times and in the manner provided or contemplated in the Agreement.

2.1.2 Except as otherwise expressly provided in the Guarantee, the Guarantee shall not impose on the Guarantor any duties, obligations or liabilities greater than those assumed by the Operator under the Agreement.

2.1.3 The Guarantee shall be binding upon the successors and assignees of the Guarantor and shall extend to and enure for the benefit of the successors or assignees of TransKarachi.

2.2 Indemnity by Guarantor

2.2.1 If the Guaranteed Obligations are, or become, unenforceable, invalid or illegal (in whole or in part), the Guarantor indemnifies and holds harmless TransKarachi, its personnel and agents, in full against and from any and all liabilities, claims, damages, loss, expenses and costs (including legal fees and expenses) which arise out of, under or in relation to any failure of the Operator to perform or discharge any or all of the Guaranteed Obligations.

2.2.2 The Guarantor, as separate and independent obligation from its duties, obligations and liabilities under Clause 2.2.1, indemnifies and holds harmless TransKarachi, its personnel and agents, in full against and from any and all liabilities, claims, damages, loss, expenses and costs (including legal fees and expenses) which arise out of, under or in relation to, any failure of the Operator to perform or discharge any or all of the Guaranteed Obligations.

2.3 Additional Security

2.3.1 The Guarantee shall be in addition to, and independent of, any other security which TransKarachi may hold from time to time in respect of the discharge and performance by the Operator of its duties, obligations and liabilities (including the Guaranteed Obligations) arising out of, under or in relation to with the Agreement.

2.4 Payment

2.4.1 The Guarantor agrees to make any payment due hereunder upon first written demand without set-off, deduction or counterclaim and without any legal formality such as protest or notice being necessary and waives all privileges or rights which it may have as a guarantor, including any right to require TransKarachi to claim payment or to exhaust remedies against the Operator or any other person.

2.4.2 Any payment made under the Guarantee shall be made free and clear of, and without deduction for or on account of, any present or future taxes, levies, imposts, duties, charges, fees, deductions or withholdings of any nature whatsoever and by whomsoever imposed.

3. RIGHTS AND OBLIGATIONS

3.1 Waiver of Defences

3.1.1 The duties, obligations and liabilities of the Guarantor under the Guarantee shall not be reduced, discharged or otherwise adversely affected by:

(a) any act, omission, matter or thing which would have discharged or affected the liability of the Guarantor had it been a principal debtor and obligor instead of a Guarantor or indemnifier; or

(b) anything done or omitted to be done by any person which, but for this provision, might operate to exonerate or discharge the Guarantor or otherwise reduce or extinguish its liability under the Guarantee.

3.2 Rights and Obligations of the Guarantor

3.2.1 The Guarantor agrees that TransKarachi shall not be obliged (and the Guarantor waives any right it may have to require TransKarachi (or any agent on its behalf)) to:

(a) take court, arbitral or other dispute resolution proceedings or to enforce any judgment or award against the Operator; or

(b) pursue any other right or claim (including the enforcement of any other security held by TransKarachi) against any person,

before claiming from the Guarantor under the Guarantee.

3.2.2 Subject to the limits of liability set out in the Agreement, if any, the Guarantor indemnifies and holds harmless TransKarachi, its personnel and agents, in full against and from any and all liabilities, claims, damages, loss, expenses and costs (including legal fees and expenses) which TransKarachi incurs in connection with:

(a) the preservation, exercise and/or enforcement of any rights arising out of, under or in relation to the Guarantee or any attempt so to do; and

(b) any discharge or release of the Guarantee.

3.2.3 Until all amounts which are or may become due from the Operator under the Agreement have been irrevocably paid in full, or unless TransKarachi directs otherwise in writing, the Guarantor shall not exercise any security or other rights which it may have against the Operator by reason of performance by it of its obligations under the Guarantee, whether such rights arise by way of set-off, counterclaim, subrogation, indemnity or otherwise.

3.3 No Reduction of Obligation

3.3.1 The duties, obligations and liabilities of the Guarantor under the Guarantee shall not be reduced or discharged by any:

(a) alteration in the relationship between the Guarantor and the Operator; or

(b) arrangements between the Operator and TransKarachi; or

(c) amendments to the provisions of the Agreement; or

(d) alteration, with or without the knowledge or consent of the Guarantor:

  (i) in the extent or nature of the services to be performed under the Agreement; and/or

  (ii) to the time for performance of the Operator's duties and obligations; and/or

  (iii) to any other duties, obligations or liabilities of the Operator arising under, out of or in connection with the Agreement; or

(e) forbearance or indulgence by TransKarachi towards the Operator or the Guarantor, whether as to payment, time, performance or otherwise; or

(f) other act or omission which, but for this provision, might exonerate or discharge the Guarantor from liability under the Guarantee; or

(g) invalidity or unenforceability of the Agreement or the insolvency, bankruptcy, winding up or reorganisation of the Operator or any other person.

3.3.2 The Guarantor agrees that the Operator and TransKarachi may do or agree to any of the matters referred to in Clause 3.3.1(b), Clause 3.3.1(c), Clause 3.3.1(d) or Clause 3.3.1(e), all of which shall be likewise guaranteed by the Guarantor in accordance with the provisions of the Guarantee.

4. COMMENCEMENT AND EXPIRY

4.1 Commencement and Operation of the Guarantee

4.1.1 The Guarantee shall come into effect when the Agreement comes into effect.

4.1.2 Without prejudice to Clause 4.1.1, the Guarantee shall come into effect in favour of TransKarachi as soon as it has been executed by the Guarantor, notwithstanding that TransKarachi may not have executed the Guarantee and in such case the Guarantee shall take effect as a unilateral declaration by the Guarantor in favour of TransKarachi and shall be deemed accepted by TransKarachi.

4.2 Expiry

4.2.1 The Guarantee shall continue in full force and effect until all duties, obligations and liabilities of the Operator arising under, out of or in connection with the Agreement have been fully performed and discharged in accordance with the provisions thereof, at which time the Guarantee shall expire and be returned to the Guarantor.

5. NOTICES, DEMANDS OR OTHER COMMUNICATIONS

5.1 Form of Notice

5.1.1 Any notice, demand or other communication under or pursuant to the Guarantee shall be:

(a) in English; and

(b) in writing; and

(c) state the Clause under or pursuant to which the notice, demand or other communication is given, issued or made.

5.1.2 Subject to Clause 5.2.4, and except as otherwise expressly provided in the Guarantee, all notices, demands or other communications shall be delivered or transmitted by hand, registered courier or electronic transmission (being either facsimile or email) to the Contact Details of the addressee.

5.2 **Delivery and Receipt**

5.2.1 Where a notice, demand or other communication is delivered by electronic transmission, the sender shall, within seven (7) Days after the electronic transmission is delivered, deliver a copy of the electronic transmission by hand or registered courier to the Contact Details of the addressee.

5.2.2 Subject to Clause 5.2.3, a notice, demand or other communication shall be deemed to be duly given to the addressee:

(a) in the case of facsimile transmission, on the date and at the time shown on the transmission report by the machine from which the facsimile was sent, subject to the machine producing a report that the facsimile was sent in its entirety to the Contact Details of the addressee; and

(b) in the case of email:

(i) at the time of receipt by the sender of an email acknowledgement from the intended addressee's information system showing that the email has been delivered to the email address of that addressee; or

(ii) if no email acknowledgement is received, then at the time the email enters an information system which is under the control of the intended addressee (and the addressee shall make available at the request of the sender, evidence of such time); and

(c) in the case of delivery by hand or registered courier, at the time of and on the date of delivery.

5.2.3 In the event that a notice, demand or other communication is received after 3:00 pm at the physical address of the addressee stated in its Contact Details, it shall be taken to have been received by the addressee at 8:00 am on the next Day.

5.2.4 The Parties may each change their respective Contact Details for the purposes of Clause 5.1 (*Form of Notice*) by giving notice to each other in accordance with the procedures for the giving, issuing or making of communications set forth in Clause 5.1 (*Form of Notice*) not less than fourteen (14) Days before such change is to take effect. Any notice of such new Contact Details shall only be effective for the purposes of Clause 5.1 (*Form of Notice*) after it is deemed received pursuant to Clause 5.2.2 and Clause 5.2.3.

6. DISPUTE RESOLUTION

6.1 Disputes under the Agreement

6.1.1 The settlement or resolution of any dispute arising under, out of or in connection with the Agreement shall be final and binding on the Parties and the Parties shall not reopen, revisit or otherwise dispute that settlement or resolution and the subject matter of that settlement or resolution.

6.2 Dispute Resolution

6.2.1 A Party may refer any dispute arising out of, under or in connection with the Guarantee to the Pakistani court of competent jurisdiction.

6.2.2 Without prejudice to Clause 6.2.1, nothing in the Guarantee shall prevent the Parties from referring a dispute to arbitration by mutual written agreement.

7. GENERAL PROVISIONS

7.1 Governing Law and Language

7.1.1 The Guarantee shall be governed by, interpreted and construed in accordance with the Laws of the Islamic Republic of Pakistan.

7.1.2 Unless expressly notified in advance by TransKarachi, the primary language of the Guarantee shall be English. All communications issued between the Parties shall be in English. Unless expressly notified in advance by TransKarachi, all meetings shall be conducted in English, and minutes of meetings shall be issued in English.

7.2 Entire Agreement

7.2.1 The Guarantee constitutes the entire agreement between the Parties in relation to all matters contained herein, including all understandings, rights, responsibilities, duties and obligations and supersedes all prior arrangements, representations, communications, negotiations, agreements and contracts (whether written or oral) made between or entered into by the Parties with respect thereto prior to the date hereof.

7.3 Severability

7.3.1 In the event that any provision of the Guarantee is held by any judicial or other competent authority to be illegal, invalid or unenforceable that provision shall be severed to the extent necessary to make the Guarantee enforceable, and it shall not affect or impair the validity, legality or enforceability of any of the other provisions of the Guarantee.

7.4 Amendment

7.4.1 No modification, amendment, addendum or variation to the provisions of the Guarantee shall be effective or binding, unless it:

(a) is made in writing; and

(b) expressly sets out the modification, amendment, addendum or variation to the provisions of the Guarantee; and

(c) refers to the Guarantee; and

(d) is signed and dated by a representative of each Party.

7.5 Waiver

7.5.1 Subject to Clause 7.5.2, no relaxation, forbearance or delay by a Party in enforcing the Guarantee will prejudice, affect or restrict the rights, responsibilities, obligations, powers or remedies of that Party nor shall any waiver by either Party of any such rights, responsibilities, obligations, powers or remedies, or of any breach of the Guarantee, be deemed to be a waiver of any other right, responsibility, obligation, power or remedy, or of any later or continuing breach of, the Guarantee.

7.5.2 Any waiver of a Party’s rights, responsibilities, obligations, power or remedies arising out of, under or in connection with the Guarantee shall be in writing, dated and signed by the Representative of the Party granting such waiver, and shall specify the right, responsibility, obligation, power or remedy and the extent to which it is being waived. No waiver of a breach of a term of the Guarantee operates as a waiver of any other breach of that term, or of a breach of any other term, of the Guarantee.

7.6 Assignment

7.6.1 The Guarantor shall not assign or transfer any of its rights or obligations under the Guarantee or any part of it.

7.6.2 Subject to giving the Guarantor seven (7) Days’ prior written notice, TransKarachi may assign or transfer the Guarantee or any part of it or any benefit or interest in or under the Guarantee.

7.7 General Representations and Warranties

7.7.1 The Guarantor represents and warrants to TransKarachi that:

(a) it has full power and authority to enter into and perform its obligations under the Guarantee;

(b) it has taken all necessary action to authorise the signing, delivery and performance of the Guarantee in accordance with its provisions; and

(c) the Guarantee constitutes the Guarantor’s legal, valid and binding obligations and is enforceable in accordance with its provisions.

7.8 Limit on Reliance

7.8.1 No Party has entered into the Guarantee relying on any representation, warranty, promise or statement made by another Party, or any other person acting on behalf of a Party, other than the representations, warranties, promises and statements set out in the Guarantee.

7.9 Counterparts

The Guarantee may be executed in any number of counterparts, each of which, when executed, shall constitute a duplicate original, but all the counterparts shall together constitute one Guarantee.

SIGNED for and on behalf
of TransKarachi

__________________________________ Witness: ______________________

<*Insert name and position of signatory*> <*Insert name and position of witness*>

SIGNED for and on behalf
of the Guarantor

__________________________________ Witness: ______________________

<*Insert name and position of signatory*> <*Insert name and position of witness*>

APPENDIX 1

DEFINITIONS AND INTERPRETATION

1. Definitions

1.1 In this Guarantee the following words and expressions shall have the meanings set out below:

1.1.1 "**Agreement**" has the meaning given to it in recital A.

1.1.2 "**Association of Persons**" means an unincorporated joint venture, partnership, consortium or other association of two (2) or more persons.

1.1.3 "**Clause**" means a clause of this Guarantee.

1.1.4 "**Contact Details**" means the contact details of a Party stated in Appendix 2 (*Agreement Particulars*) or such other contact details as may be notified pursuant to Clause 5.2.4.

1.1.5 "**Guarantee**" means this parent company guarantee, including the recitals and Appendix 1 (*Definitions and Interpretation*) and Appendix 2 (*Agreement Particulars*).

1.1.6 "**Guaranteed Obligations**" means the duties and obligations of the Operator arising under, out of or in connection with the Agreement, including the discharge of any indebtedness, monies and/or liabilities due, owing or incurred by the Operator to STMA arising under, out of or in connection with the Agreement.

1.1.7 "**Law**" means all national or public legislation, decrees, ordinances, rules and regulations relevant to this Guarantee as issued and in force within the Islamic Republic of Pakistan.

1.1.8 "**Member**" has the meaning given to it in recital B.[1]

1.1.9 "**Operator**" has the meaning given to it in recital A.

2. Interpretation

2.1 In this Guarantee:

2.1.1 Clause headings are for convenience only and shall not be taken into consideration in the interpretation of this Guarantee.

2.1.2 The following rules shall apply to the interpretation of this Guarantee:

(a) the singular shall include the plural and vice versa;

(b) a reference to a gender shall include the other genders;

(c) a reference to a law shall include that law as amended, consolidated, re-enacted or replaced from time to time;

(d) a reference to "**Days**" means calendar days;

(e) the word "**person**" shall include a natural person and any body or entity whether incorporated or not;

(f) the words "**written**" or "**in writing**" shall include any communication sent by letter, facsimile transmission or email;

(g) wherever "**include**" or any form of that word is used, it shall be construed as if it were followed by "**without being limited to**"; and

(h) a reference to an "**agent**" shall mean any person with a contractual relationship with a Party and carrying out activities or obligations on behalf of that Party;

(i) a reference to "**time**" shall be a reference to time in Karachi, Islamic Republic of

---

[1] *Delete if the Operator is a single entity.*

Pakistan.

APPENDIX 2

AGREEMENT PARTICULARS

Contact Details

For TransKarachi:

TransKarachi
<*Address line1*>
<*Address line2*>
<*Address line3*>
Tel: <*Insert TPC's telephone number*>
Fax: <*Insert TPC's fax number*>
Email: <*Insert TPC's email address*>
For the Attention of <__________________>

For the Guarantor:

<*Insert Guarantor's Name*>
<*Address line1*>
<*Address line2*>
<*Address line3*>
Tel: <*Insert Guarantor's telephone number*>
Fax:<*Insert Guarantor's fax number*>
Email:<*Insert Guarantor's email address*>
For the Attention of <__________________>

KARACHI

BUS RAPID TRANSIT

PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 - DRAFT CONTRACTS

SYSTEM CONTROL AND SERVICE PROVIDER – FUND MANAGEMENT AGREEMENT

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

FUND MANAGEMENT AGREEMENT

between

TransKarachi

and

[SCSP Company]

and

[Fund Manager]

Draft date: January 2018

DRAFT

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THIS FUND MANAGEMENT AGREEMENT (the “**Agreement**”) is made on [•] 2019

BETWEEN

1. **TransKarachi**, a company established under Section 42 of the Companies Act of 2017, with company registration no. [•] and whose registered address is at [•] (“**TransKarachi**”); and
2. <***Insert name of the SCSP Company***>, a company incorporated in [•], with company registration no. [•] and whose registered address is at [•] (the “**System Control Service Provider**); and
3. <***Insert name of the Fund Manager***>, a company incorporated in [•], with company registration no. [•] and whose registered address is at [•] (the “**Fund Manager**”).

TransKarachi, the System Control Service Provider and the Fund Manager are individually referred to herein as a “**Party**” and collectively as the “**Parties**”.

WHEREAS:

A. TransKarachi is a corporate entity established by the Government of Sindh, Pakistan responsible for design, procurement, implementation and ongoing BRT operations in the Karachi Sustainable BRT Corridor System (the “**Karachi Red Line BRT System**”).

B. TransKarachi has entered into a System Control Service Provider Agreement with the System Control Service Provider who would be primarily responsible for the administration and day-to-day operation of the Karachi BRT System.

C. TransKarachi now intends to appoint a Fund Manager to provide fund management services and manage the Accounts and, specifically, the modalities of payments into and out of the Accounts, in accordance with the terms and conditions of this Agreement.

NOW THE AGREEMENT PROVIDES:

PART A - GENERAL

1. Preliminary Matters

1.1 Definitions and Interpretation

1.1.1 The defined words and expressions set out in clause 1 of Annex A [*Definitions and Interpretation*] hereof and the provisions relating to the construction and interpretation of the Agreement set out in clause 2 of Annex A [*Definitions and Interpretation*] hereof shall apply to the Agreement.

1.2 Effect of this Agreement

1.2.1 The Parties hereby agree that this Agreement shall immediately be binding on them as of the Effective Date.

2. Appointment of the Fund Manager

2.1 Appointment

2.1.1 TransKarachi’s signing this Agreement shall indicate its appointment of the Fund Manager to provide the Services.

2.1.2 The Fund Manager hereby accepts the appointment and agrees to provide the Services in accordance with the terms and conditions of this Agreement.

2.2 Commencement of the Services and Term

2.2.1 Unless this Agreement is earlier terminated, the Fund Manager shall continuously provide the Services contemplated under this Agreement (as may be amended pursuant to its terms) for the lesser of a term of twelve (12) years commencing from the Effective Date or until the expiry or earlier termination of the System Control Service Provider Agreement with the System Control Service Provider.

PART B - ACCOUNTS

3. Opening of Accounts

3.1 The Parties shall do all things and sign all documents necessary to establish and maintain the Accounts with the Fund Manager.

3.2 Within fourteen (14) days from the Effective Date:

3.2.1 TransKarachi shall have opened with the Fund Manager:

(a) the Fares Account;

(b) the Pool Account; and

(c) the TransKarachi Own Account;

3.2.2 the System Control Service Provider shall have opened with the Fund Manager the SCSP Sales Receipt Account.

3.3 The Fund Manager shall maintain the Accounts in accordance with applicable banking policies, practices and/or regulations and without any bank charges other than the Fund Management Fee, provided that in the event of any conflict between the provisions of this Agreement and any applicable instructions from a Party acting alone, the provisions of this Agreement shall prevail.

3.4 The Fund Manager shall provide detailed statements to each Party upon their respective requests, but no less frequently that monthly.

3.5 Unless agreed otherwise by the Parties, the Parties shall ensure that all accounts established and/or maintained pursuant to this Agreement are interest-bearing accounts and accrued interest shall be distributed in accordance with the terms of this Agreement and/or applicable banking policies, practices and/or regulations.

4. SCSP Sales Receipt Account

4.1 The System Control Service Provider shall ensure that:

4.1.1 it deposits all amounts received from Cards Top-Ups and Single Journey Sales as soon as practicable (but no later than within two (2) days of receipt unless such deposits are delayed by observed banking and/or public holidays) into the SCSP Sales Receipt Account; and

4.1.2 it has done all things necessary, executed all documents and issued applicable written standing instructions satisfactory to the Fund Manager to permit the Fund Manager to transfer all amounts remaining in the SCSP Sales Receipt Account at the end of each banking day into the Pool Account and/or the Fares Account as applicable in accordance with this Agreement.

5. Income and Receipts

5.1 The Parties shall execute and issue all standing instructions, do all things and sign all documents necessary to ensure that, at each Relevant Time:

5.1.1 the SCSP Sales Receipt Account shall receive all amounts on account of Cards Top-Ups performed and registered by the AFCS and/or ITS Systems and all amounts on account of Single Journey Sales;

5.1.2 the Pool Account shall receive from the SCSP Sales Receipt Account all amounts on account of Cards Top-Ups performed and registered by the AFCS and/or ITS Systems; and

5.1.3 the Fares Account shall receive:

(a) from the Pool Account all Fare Receipts from Cards;

(b) from the SCSP Sales Receipt Account all Fare Receipts from Single Journey Tickets.

6. TransKarachi Support and the Fares Account

6.1 TransKarachi shall establish the Fares Account with a beginning balance of PKR [x][1] and shall ensure that the Fares Account balance never decreases below the beginning balance amount. TransKarachi shall further ensure that on or before the end of each calendar month, the available balance in the Fares Account shall be sufficient to cover payment of the Fund Management Fee, monthly payments due to the System Control Service Provider, and the fees payable to the Operator 1 and the Operator 2.

6.2 TransKarachi shall, within ten (10) days of the end of each month, submit to the Fund Manager its proof of approval of fees and amounts payable to the Fund Manager, the System Control Service Provider, the Operator 1 and the Operator 2, and the Fund Manager shall make the approved transfers/payments to the System Control Service Provider, the Operator 1 and the Operator 2 from the Fares Account in accordance with this Agreement.

6.3 The Fund Manager, prior to making any distribution and/or transfer to TransKarachi and/or the TransKarachi Account from the Fares Account, shall ensure that at all times the beginning balance amount is maintained.

6.4 In addition to the beginning balance amount, TransKarachi shall maintain the Contingency Fund amount of not less than PKR [y] in the Fares Account. The Contingency Fund amount shall be established and built up by the Fund Manager pursuant to the terms of clause 7.1.5 hereof.

7. Withdrawals and Payments

7.1 The Fund Manager agrees to make payments and/or transfers (as applicable) at each Relevant Time from the amount standing to the credit of the:

7.1.1 SCSP Sales Receipt Account:

(a) to the Pool Account of all Cards Top-Ups in accordance with clause 4.1.1 and the information provided by the System Control Service Provider as retrieved from the AFCS / ITS Systems and to the Fares Account of all Fare Receipts from the Single Journey Tickets in accordance with clause 5.1.3(b) and the information provided by the System Control Service Provider as retrieved from the AFCS / ITS Systems; and

(b) as may from time to time be requested jointly in writing by the System Control Service Provider and TransKarachi subject to any restrictions arising from this Agreement.

7.1.2 Pool Account:

(a) to the Fares Account in accordance with clause 5.1.3(a) and the information provided by the System Control Service Provider as retrieved from the AFCS / ITS Systems; and

(b) as may from time to time be requested in writing by TransKarachi subject to any restrictions arising from this Agreement.

7.1.3 Fares Account:

(a) upon written confirmation of TransKarachi, for the payment of the Fund Management Fee;

(b) upon written confirmation of TransKarachi, for the payment of the SCSP Fee; and

(c) upon written confirmation of TransKarachi and the System Control Service Provider, for the payments to the Operator 1 and the Operator 2.

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[1] Recommendation: This should be 3-6 months of estimated Fees.

7.1.4 At the end of each calendar year and subject to:

(a) the approval by TransKarachi's board of directors of its audited financial statement(s); and

(b) the payment of the various fees in accordance with clause 7.1; and

(c) the satisfaction of all fees/costs/expenses of TransKarachi in accordance with this Agreement; and

(d) the establishment of the Contingency Fund in accordance with clause 7.1.5

the Fund Manager agrees to transfer, at TransKarachi's request, all profits (as reflected in its audited financial statement(s)) earned by TransKarachi and standing to credit in the Fares Account into the TransKarachi Own Account. Such transfer instruction from TransKarachi to the Fund Manager shall be supported by (i) the relevant audited financial statement(s) and (ii) a unanimously passed resolution from TransKarachi's board of directors.

7.1.5 TransKarachi Contingency Fund

(a) The Fund Manager shall retain amounts that would otherwise be payable to TransKarachi (or transferrable to TransKarachi or the TransKarachi Account) in order to establish a Contingency Fund of PKR [X] within the Fares Account.

(b) The Fund Manager shall be entitled to release to TransKarachi and/or otherwise transfer amounts payable to TransKarachi (or transferrable to TransKarachi or the TransKarachi Account) once the Contingency Fund amount has been reached.

(c) The Fund Manager shall not, in the absence of a board resolution passed by a unanimous vote of the current voting members of the TransKarachi board of directors, disburse and/or otherwise transfer any amounts held within the Contingency Fund.

(d) If the Contingency Fund is reduced for any reason, the Fund Manager shall replenish the fund by retaining amounts that would otherwise be payable to TransKarachi (or transferrable to TransKarachi or the TransKarachi Account) until the Contingency Fund amount is fully replenished.

7.2 Except as otherwise expressly specified in this Agreement, neither TransKarachi nor the System Control Service Provider shall be entitled to require the Fund Manager to make, and the Fund Manager shall not make any transfer, withdrawal, payment or deduction of any kind whatsoever from the Accounts that are not specified by this Agreement and/or agreed to in writing by the Parties.

7.3 In establishing the balance standing to the credit of the Fares Account or the Pool Account at any time, the Fund Manager may take into account credits to, and withdrawals from, such account which are to be made on such day.

7.4 Where any withdrawal required under this Agreement cannot be made in its entirety or where the Fund Manager has reason to believe that any future withdrawal required under this Agreement cannot be made in its entirety, the Fund Manager shall promptly notify TransKarachi, and the System Control Service Provider of that fact and provide details of the payment not made, the date on which it should have been made (or is to be made) and the amount unpaid (or to be paid).

7.5 Notwithstanding anything else in this Agreement, no person shall request or require that any withdrawal be made from the Pool Account or the Fares Account if it would cause that account to become overdrawn and to the extent that any withdrawal, if made in full, would cause that account to become overdrawn, such withdrawal shall be made in part only in the largest amount possible as will not result in that account becoming overdrawn.

8. Fund Manager

8.1 The Fund Manager may:

8.1.1 rely upon settlement instructions generated by the AFCS / ITS Systems;

8.1.2 rely upon the written authorizations and/or instructions from TransKarachi and/or the System Control Service Provider in making monthly payments/transfer/distributions in accordance with this Agreement; and

8.1.3 rely upon any communication or document believed by it to be genuine and, in particular, rely upon any notice, request or other communication of another Party for the purposes of this Agreement if such notice, request or other communication purports to be signed or sent by or on behalf of an authorised signatory of the other Party.

8.2 The Fund Manager shall immediately notify the TransKarachi of any failure by the System Control Service Provider to meet its obligations under clause 4.

8.3 The Fund Manager shall be responsible for the accuracy and/or completeness of statements provided in accordance with clause 3.4.

8.4 Each of the other Parties agrees that it will not assert or seek to assert against any director, officer or employee of the Fund Manager any claim it might have against the Fund Manager in respect of the Fund Manager's obligations under this Agreement, so long as such director, officer and/or employee was acting within his/her authority.

8.5 Subject to Applicable Law, the Fund Manager may accept deposits from, lend money to, invest in and generally engage in any kind of banking or other business with TransKarachi and/or its shareholders and any other party.

9. Fund Management Fee

9.1 For all the services provided by the Fund Manager under this Agreement, the Fund Manager shall be entitled to the Fund Management Fee in the gross fixed fee amount of PKR [•] ([•] Pakistani rupee) per [calendar month], to be indexed annually on the anniversary date of signature of this Agreement in accordance with the [general Consumer Price Index as published by the Pakistan Bureau of Statistics], or its successor, which shall be paid from the Fares Account in accordance with clause 7.1.3(a).

10. Security Interest / Set off

10.1 The Fund Manager confirms that it has not received any notification of any assignment or other dealing with the Accounts from any person.

10.2 The Fund Manager, TransKarachi and the System Control Service Provider shall not:

10.2.1 create or effect any Encumbrance over the Pool Account, the Fares Account or the SCSP Sales Receipt Account to the benefit of any person;

10.2.2 assign any of their rights under this Agreement or in relation to the Pool Account, Fares Account or the SCSP Sales Receipt Account.

10.3 The Fund Manager shall not:

10.3.1 be entitled to novate or assign all or any part of its rights under this Agreement;

10.3.2 take or accept any security interest of any nature whatsoever over the Pool Account, the Fares Account or the SCSP Sales Receipt Account; and

10.3.3 exercise any banker's rights of set off whether under contract, or implied by law, in respect of the Fares Account, Pool Account or the SCSP Sales Receipt Account.

PART C - BREACH AND TERMINATION

11. Breach and Termination

11.1 If the Fund Manager commits a Material Breach of this Agreement and fails to remedy the breach within ten (10) calendar days after receipt from TransKarachi of a notice calling upon it to do so or within such other time as specified by TransKarachi or agreed between TransKarachi and the Fund Manager then TransKarachi shall be entitled, in addition to and without prejudice to any other right it may have under Applicable Law or in accordance with this Agreement, to seek specific performance of this Agreement or to terminate this Agreement forthwith on notice to the Fund Manager and in either event, to recover any and all costs, losses and/or damages it has or may sustain.

11.2 For purposes of this Agreement, a Material Breach shall be if the Fund Manager:

11.2.1 novates, assigns, delegates, cedes or sub-contracts this Agreement or part thereof in contravention of the provisions hereof without having obtained TransKarachi's prior written consent; or

11.2.2 breaches its obligations arising from clause 3.4 or clause 7; or

11.2.3 becomes insolvent, bankrupt or seeks protection against its creditors under the Applicable Law; or

11.2.4 consistently, in TransKarachi's view, fails to observe any other provision of this Agreement (despite being given notice in relation thereto).

11.3 In the event of termination of this Agreement:

11.3.1 the Fund Manager shall not be entitled to any further payment until TransKarachi has finally ascertained the additional costs that it has incurred and will incur in having others perform the Services for the remainder of the term of this Agreement; and

11.3.2 after TransKarachi has determined such additional costs, the Fund Manager shall be entitled to payment for those Services performed in accordance with this Agreement prior to the date of termination but which have not been paid for less any such additional costs, provided that if the amount of such additional costs exceeds the amount of due payments for the Services performed in accordance with the Agreement, the Fund Manager shall pay the excess to TransKarachi within the period determined in TransKarachi's written demand; and

11.3.3 the Fund Manager shall transfer upon request by TransKarachi all funds held in the Accounts, to such entity or account as TransKarachi may in writing direct; and

11.3.4 the Fund Manager shall not have, or purport to exercise, any right, interest or claim over or in relation to the Accounts; and

11.3.5 the Fund Manager shall comply with all TransKarachi's reasonable instructions and directions regarding such termination.

PART D - MISCELLANEOUS MATTERS

12. Dispute resolution

12.1 Disputes

12.1.1 For the purposes of this clause 12, the term “dispute” shall be interpreted in its widest sense and shall include any dispute or difference in connection with or in respect of the conclusion or existence of this Agreement, the carrying into effect of this Agreement, the interpretation or application of the provisions of this Agreement, the Parties’ respective rights and obligations in accordance with and arising out of this Agreement or the validity, enforceability, rectification, termination or cancellation, whether in whole or in part, of this Agreement.

12.1.2 Save as otherwise provided for in this Agreement, any dispute between the Parties arising in connection with this Agreement shall be resolved in accordance with the provisions of this clause 12.

12.2 Resolution by Chief Executives

12.2.1 Any dispute arising in connection with this Agreement may be referred by either Party to the Chief Executive of that Party (or such other senior executives as the relevant Parties may determine) who shall attempt to resolve the matter within ten (10) Business Days of the dispute being so referred to them or within such other time as may be agreed between the Parties.

12.3 Arbitration

12.3.1 If the Parties are unable to resolve the dispute pursuant to clause 12.2, either Party shall be entitled to refer a dispute to arbitration in accordance with this clause 12 by notifying the other Party in writing of its intention to do so.

12.3.2 The arbitration proceedings shall be carried out under the procedures, rules and regulations of [•][2] and its successors, and such procedures, rules and regulations shall be deemed to be incorporated into this clause 12.3 by reference. Any such arbitration shall be subject to the Applicable Law.

12.3.3 The seat of the arbitration shall be [•][3] and all arbitration hearings shall be held in [•] unless otherwise agreed in writing by the Parties.

12.3.4 Unless otherwise required by TransKarachi, such arbitration shall be conducted in the English language and the award of any arbitrator or arbitral panel, together with the reasons for the determination, shall be written in the English language.

12.3.5 Unless otherwise required by TransKarachi, all evidence, submissions or documents presented at the arbitration in a language other than in the English language shall be accompanied by a simultaneous English language translation thereof, if oral, or if written, a certified English language translation.

12.3.6 The arbitrator or arbitral panel shall have full power to open up, review and revise any determinations, decisions or findings in relation to the dispute.

12.3.7 The obligations of the Parties shall not be altered by reason of the arbitration being conducted during the term of the Agreement.

12.3.8 Any monetary award in any arbitration shall be denominated and payable in PKR (Pakistani rupee).

12.3.9 The Parties agree that all interim or final decisions and/or awards of the arbitrator or arbitral panel shall:

(a) be binding on the Parties and shall be given effect and implemented forthwith by them; and

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[2] Recomendation: the ICC, 3 arbitrators

[3] Note that Pakistan is a signatory to the New York Convention (the enforcement of ***international*** arbitral awards) and so if we expect the Operator to also be a Pakistani company, then arbitrating in Pakistan may not be a good option (as enforcement is likely to ne an issue). An arbitral award must be issued in a country that is other than the country in which enforcement is being sought for the NYC to apply.

(b) be subject to the confidentiality restrictions in this Agreement and except as provided by agreement between the Parties, may not be publicised or otherwise disclosed provided always that nothing in this clause shall prevent either Party from applying to any court of competent jurisdiction to enforce the award.

12.3.10 The Parties hereby expressly agree irrevocably to waive all rights and recourse to appeal or challenge, and neither Party shall request the local courts to open up, revise or review, the final award of the arbitrator or arbitral panel save and except in the specific instances set out in the Recognition and Enforcement (Arbitration Agreements and Foreign Arbitral Award) Act, 2011 as may be modified and/or amended.

12.3.11 Reference of a dispute to arbitration shall not in any way vitiate nor invalidate the Agreement neither shall it be grounds for any Party to cease performing its obligations nor to terminate this Agreement and the Parties shall proceed with its obligations with all due diligence.

13. Indemnity

13.1 The Parties (other than TransKarachi) shall indemnify and hold harmless TransKarachi and its personnel against and from all liabilities, claims, damages, loss, expenses and costs (including legal fees and expenses) which arise out of or in relation to any liabilities, claims, damages, loss, expenses or costs (including legal fees and expenses) incurred by third parties on account of the Services or Accounts or their breach of any of their obligations under this Agreement.

14. Periodic review of the Agreement

14.1 In view of the long-term nature of this Agreement and in order to provide a continuous means for the assessment of:

14.1.1 TransKarachi’s contract management systems;

14.1.2 various aspects of the relationship between the Parties which would allow for inter alia an improvement in conflict resolution and the sharing of information between the Parties,

the Parties (other than TransKarachi) acknowledge that TransKarachi will review the provisions of this Agreement every three (3) years for the duration of this Agreement.

14.2 To the extent that TransKarachi wishes to propose any amendment to this Agreement pursuant to such review, such proposal shall be discussed and considered in good faith, but shall not be of any force or effect unless reduced to writing and signed by or on behalf of all Parties. For the avoidance of doubt, should the Parties fail to reach agreement as provided for in this clause 14, such failure shall not constitute a dispute as contemplated in clause 12.

15. Addresses and notices

15.1 The Parties choose for the purposes of this Agreement the following addresses:

15.1.1 Fund Manager: [•]

15.1.2 TransKarachi: [•]

15.1.3 System Control Service Provider: [•].

15.2 Any legal process to be served on any of the Parties may be served on it at the physical address specified for it in clause 15.1 and it chooses that address for all purposes under this Agreement.

15.3 Any notice required by this Agreement to be given in writing shall, if given by telefax, email or cell phone-based short message service (“sms”), be regarded as having been given in writing for purposes of this Agreement, provided that the Parties may only utilise sms notification for operational authorisations in circumstances where operational action is required immediately.

15.4 Where operational authorisations are required, TransKarachi will issue and log an authorisation number and any relevant notice in accordance with this clause 15 shall quote such authorisation number.

15.5 A notice to any of the Parties which is sent by registered post in a correctly addressed envelope to the address specified for it in clause 15.1 shall be deemed to have been received within fourteen (14) days from the date it was posted, or which is delivered to the Party by hand at the physical address specified for it in clause 15.1, shall be deemed to have been received on the day of delivery..

15.6 Each notice by telefax to a Party at the telefax number specified for it in accordance with clause 15.1 shall be deemed to have been received within four (4) hours of transmission if it is transmitted during normal business hours of the receiving Party or within four (4) hours of the beginning of the next Business Day after it is transmitted, if it is transmitted outside those business hours.

15.7 Any notice by email to a Party at the email addresses of its authorised representatives shall be deemed to have been received within twenty (20) minutes of transmission if transmitted at any time during which the Services are ordinarily rendered and if transmitted outside such time, within ten (10) minutes of recommencement of the rendering of the Services.

15.8 Any notice by sms to a Party at the mobile numbers of its authorised representatives shall be deemed to have been received within twenty (20) minutes of transmission if transmitted at any time during which the Services are ordinarily rendered and if transmitted outside such time, within twenty (20) minutes of recommencement of the rendering of the Services.

15.9 Any notice in accordance with this clause 15 given by sms shall be followed by a telefax or email confirming the contents and date of transmission of such sms.

15.10 Notwithstanding anything to the contrary in this clause 15, a notice or other communication actually received by any of the Parties (and for which written receipt has been obtained) shall be adequate notice or communication to it notwithstanding that the notice was not sent to or delivered at its chosen address.

15.11 Any Party may by a notice to the other Parties change its physical or postal address, telefax number, email address or mobile number for the purposes of this clause 15 to any other physical or postal address, telefax number, email address or mobile number provided that the change shall become effective on the seventh (7th) day after the receipt of the notice.

16. Change in Law

16.1 If a Change in Law occurs or is imminent that affects the rights and obligations of the Fund Manager under this Agreement, the Fund Manager shall notify TransKarachi within fourteen (14) days of the date of such Change in Law occurring or (if earlier) coming to the attention of the Fund Manager and the Parties shall discuss the effects of the Change in Law and endeavour in good faith to arrive at a resolution.

16.2 Any resolution reached between the Parties shall be recorded in writing and such record shall be signed by all Parties.

16.3 If the Parties are unable to reach a resolution, then the Parties shall (as required) implement such change(s) in the law at their own costs and pursue resolution of any dispute in relation thereto in accordance with clause 12.

17. Remedies

17.1 No remedy conferred by this Agreement is intended to be exclusive of any other remedy which is otherwise available at law, by statute or otherwise. Each remedy shall be cumulative and in addition to every other remedy given hereunder or now or hereafter existing at law, by statute or otherwise. The election of any one or more remedy by any of the Parties shall not constitute a waiver by such Party of the right to pursue any other remedy.

18. Confidentiality

18.1 Each Party shall at all times keep in confidence the Confidential Information of the other Party which it may acquire for the purposes of or in connection with this Agreement (whether prior to or after the Effective Date) and shall not use or permit the use of such Confidential Information and shall procure that its employees shall not use the Confidential Information, for any other purpose and shall not disclose such Confidential Information to any third party.

18.2 Notwithstanding clause 18.1, a Party may disclose the Confidential Information of the other Party to such former Party’s employees or authorised representatives to the extent that such employees or authorised representatives need to know the Confidential Information and shall ensure that such employees or authorised representatives are aware of and comply with, the confidentiality obligations contained in this clause 18.

18.3 Each Party shall take all such steps as may be reasonably necessary to prevent the Confidential Information of the other Party from falling into the hands of an unauthorised third party.

18.4 The Parties (other than TransKarachi) shall not make any comments to the media relating to this Agreement and any related matter nor shall it respond to any queries from the media without the prior written approval of TransKarachi.

19. Severance

19.1 In the event that any provision of the Agreement is held by any judicial or other competent authority to be illegal, invalid or unenforceable that provision shall be severed to the extent necessary to make the Agreement enforceable, and it shall not affect or impair the validity, legality or enforceability of any of the other provisions of the Agreement.

20. No agency

20.1 No provision of this Agreement shall be construed as constituting an agency, partnership, or joint venture between the Parties and neither Party shall have any express or implied right to bind the other Party in any way or to represent the other Party unless specifically provided to the contrary in this Agreement.

21. Corruption and Fraud

21.1 The Parties warrant that in entering into the Agreement they have not committed any Prohibited Act.

21.2 In the event that any Party (other than TransKarachi) is contacted by a Public Official requesting or suggesting that it acts in a manner which would constitute a Prohibited Act, such Party shall immediately provide TransKarachi in writing with full details of the request (including the identity of the Public Official making the request). In the event that such Party fails to comply with the requirements of this clause 21 TransKarachi shall be entitled to terminate the Agreement pursuant to clause 11.

22. Entire Agreement

22.1 This Agreement constitutes the entire agreement between the Parties in relation to all matters contained herein, including all understandings, rights, responsibilities, duties and obligations and supersedes all prior arrangements, representations, communications, negotiations, agreements and contracts (whether written or oral) made between or entered into by the Parties with respect thereto prior to the Effective Date. None of the Parties shall have any claim or right of action arising from any undertaking, representation or warranty not included in this Agreement.

23. No stipulation for the benefit of a third person

23.1 Save as is expressly provided for in this Agreement, no provision of this Agreement constitutes a stipulation for the benefit of a third person which, if accepted by the person, would bind any Party in favour of that person.

24. No representations

24.1 A Party may not rely on any representation which allegedly induced that Party to enter into this Agreement, unless the representation is provided in this Agreement.

25. Amendment

25.1 Except as set out elsewhere in this Agreement, no modification, amendment, waiver, addendum or variation to the accordance with the Agreement shall be effective or binding, unless it:

25.1.1 is made in writing; and

25.1.2 expressly sets out the modification, amendment, waiver, addendum or variation to the accordance with the Agreement; and

25.1.3 refers to the Agreement; and

25.1.4 is signed and dated by a representative of each Party.

26. Indulgences

26.1 The grant of any indulgence, extension of time or relaxation of any provision by a Party under this Agreement shall not constitute a waiver of any right by the grantor or prevent or adversely affect the exercise by the grantor of any existing or future right of the grantor.

27. General co-operation

27.1 The Parties shall co-operate with each other and shall each execute and deliver to the other Party such other instruments and documents and take such other actions as may be reasonably requested from time to time in order to carry out, evidence and confirm their rights and the intended purpose of this Agreement.

28. Governing law

28.1 This Agreement is to be governed, interpreted and construed in accordance with the laws of the Islamic Republic of Pakistan.

29. Language

29.1 Unless expressly notified in advance by TransKarachi, the primary language of the Agreement shall be English. All documents and communications issued between the Parties shall be in English. Unless expressly notified in advance by TransKarachi, all meetings between the Parties shall be conducted in English, and minutes of meetings shall be issued in English.

30. Independent advice

30.1 Each of the Parties hereby respectively agrees and acknowledges that:

30.1.1 it has been free to secure independent legal advice as to the nature and effect of each provision of this Agreement and that it has either taken such independent legal advice or has dispensed with the necessity of doing so; and

30.1.2 each provision of this Agreement is fair and reasonable in all the circumstances and is part of the overall intention of the Parties in connection with this Agreement.

31. Good faith

31.1 The Parties shall, at all times, act in good faith towards each other and shall not bring the other Party into disrepute.

32. Survival of rights, duties and obligations

32.1 The Surviving Provisions will survive termination or completion of the Agreement.

32.2 In the event that the Agreement is terminated or completed, neither Party shall be liable to the other Party except:

32.2.1 under the Surviving Provisions; or

32.2.2 in respect of any breach of the Agreement occurring before such termination or completion; or

32.2.3 any rights or liabilities between the Parties that were pre-existing as at the date of termination or completion.

33. Waiver

33.1 Subject to clause 33.2, no relaxation, forbearance or delay by a Party in enforcing the Agreement will prejudice, affect or restrict the rights, responsibilities, obligations, powers or remedies of that Party nor shall any waiver by either Party of any such rights, responsibilities, obligations, powers or remedies, or of any breach of the Agreement, be deemed to be a waiver of any other right, responsibility, obligation, power or remedy, or of any later or continuing breach of, the Agreement.

33.2 Any waiver of a Party’s rights, responsibilities, obligations, power or remedies arising out of, under or in connection with the Agreement shall be in writing, dated and signed by the representative of the Party granting such waiver, and shall specify the right, responsibility, obligation, power or remedy and the extent to which it is being waived. No waiver of a breach of a term of the Agreement operates as a waiver of any other breach of that term, or of a breach of any other term, of the Agreement.

34. Costs

34.1 Any costs, including all legal costs on an attorney and own client basis and taxes, incurred by a Party arising out of or in connection with a breach by another Party shall be borne by the Party in breach.

Signed on …………………. 2018

Witnesses

....

for TransKarachi

....

duly authorised and warranting such

Name: ....

Position:______________________________

Signed on …………………. 2018

Witnesses

....

for [Fund Manager]

....

duly authorised and warranting such [ ]

Name: ....

Position:______________________________

Signed on …………………. 2018

Witnesses	for [Service Control System Provider]
....	....
	duly authorised and warranting such [ ]
	Name: ....
	Position:______________________________

ANNEX A

DEFINITIONS AND INTERPRETATION

1. Definitions

1.1 In the Agreement, the following words and expressions shall have the meanings set out below:

1.1.1 "**Accounts**" means Fares Account, Pool Account, SCSP Sales Receipt Account and the TransKarachi Account;

1.1.2 "**AFCS / ITS Systems**" means the automated fare collection and intelligent transportation systems being supplied and operated for the purposes of the System;

1.1.3 "**Agreement**" means this agreement as amended from time to time and including the Annexes;

1.1.4 "**Annexes**" means the annexes attached to this Agreement;

1.1.5 "**Applicable Law**" means any constitution, statute, ordinance, treaty, decree, proclamation or subordinated legislation or other legislative measure, as amended from time to time, including all national and provincial statutes and legislation and all municipal by-laws, as well as the common law and customary law and any judgment, decision, order or rule of any court or tribunal with relevant jurisdiction and any decision made by judicial or administrative bodies in accordance with any of the foregoing;

1.1.6 "**Business Day**" means any day other than a Saturday, Sunday or public holiday in [•];

1.1.7 "**Cards**" means any contactless medium that can be used by a passenger as an identifier and storage device for travel rights and/or stored value to use the System;

1.1.8 "**Cards Top-ups**" means payments initiated by Cards holders to top up the stored value balance on the Cards;

1.1.9 "**Change in Law**" means:

(a) the adoption of a new Law; or

(b) a change in or repeal of a existing Law,

which after the Effective Date results in:

(c) a change in the taxes, duties or levies payable by the Fund Manager in respect of the Services; or

(d) a change in or the repeal of any other requirement for the performance of the obligations under this Agreement;

1.1.10 "**Confidential Information**" means all information, without limitation, of whatsoever nature:

(a) relating to the Disclosing Party's business, operations, processes, drawings, sketches, plans, models, product information, know-how, market opportunities, customers and business affairs;

(b) relating to the relationship of the Disclosing Party with its customers and suppliers; or

(c) relating to the contents of this Agreement and any other information received pursuant to this Agreement, but excludes information which:

(a) is required to be disclosed under any law or regulation, or by any Regulatory Body, including any stock exchange on which a Receiving Party may be listed, provided that the Receiving Party in question shall, to the extent possible, first consult with the Disclosing Party before making any such disclosure, statement or announcement; or

(b) is in the public domain or enters into the public domain in any way, provided that the entry of such information into the public domain did not entail a breach of this Agreement by the Receiving Party; or

(c) the Receiving Party can show it was within its possession or knowledge, such information being in its use or having been recorded in its files, computers or other recording media, prior to receipt thereof from the Disclosing Party and which information was not previously acquired by the Receiving Party under any obligations of confidence or unlawfully; or

(d) is disclosed by the Receiving Party with the prior written approval of the Disclosing Party; or

(e) was disclosed by the Disclosing Party to a third party without restriction on disclosure or use, including without limitation, by way of a patent specification; or

(f) is hereafter disclosed or made available in good faith to the Receiving Party from a source other than the Disclosing Party, without breach by the Receiving Party of any obligation of confidentiality or non-use owed to the Disclosing Party or without breach by such other source who, to the knowledge of the Disclosing Party, is not subject to an obligation of confidentiality or non-use owed to the Disclosing Party; or

(g) is developed independently by the Receiving Party without reference to the Confidential Information;

1.1.11 “**Contingency Fund**” means the fund established by the Fund Manager pursuant to clause 7.1.5 and maintained in the Fares Account for the benefit of TransKarachi;

1.1.12 “**Disclosing Party**” means the Party disclosing Confidential Information to the Receiving Party;

1.1.13 “**Effective Date**” means when this Agreement has been signed by each Party, the latest of the dates upon which this Agreement was signed by any Party;

1.1.14 “**Encumbrance**” means:

(a) any mortgage, pledge, lien, assignment or cession conferring security, hypothecation, security interest, preferential right or trust arrangement or other encumbrance securing any obligation of any person or any other charge (whether equitable or otherwise) of whatsoever nature or howsoever described; or

(b) any arrangement under which money or claims to, or for the benefit of, a bank or other account may be applied, set off or made subject to a combination of accounts so as to effect discharge of any sum owed or payable to any person; or

(c) any other type of preferential agreement or arrangement (including any title transfer and retention arrangement), the effect of which is the creation of a security interest;

1.1.15 "**Fares Receipts**" means payments initiated by the AFCS / ITS Systems to the Fares Account payable from the Pool Account when a Card is used to start a trip on the System and payable from the SCSP Sales Receipt Account when a Single Journey Ticket is purchased;

1.1.16 "**Fares Account**" means an interest bearing account to be established and maintained by TransKarachi with the Fund Manager for purposes of, among other things, making certain payments to the Fund Manager, the System control Service Provider and the Operators in accordance with this Agreement;

1.1.17 "**Fund Management Fee**" means the fee referred to in clause **Error! Reference source not found.**;

1.1.18 "**Material Breach**" means the breach of the Agreement by the Fund Manager referred to in clause 11.2;

1.1.19 "**Month**" or "**Monthly**" means a calendar month;

1.1.20 "**Operator 1**" means the entity providing vehicle operating and related services as identified by TransKarachi as Operator 1.

1.1.21 "**Operator 2**" means the entity providing vehicle operating and related services as identified by TransKarachi as Operator 2.

1.1.22 "**Party**" means a party to this Agreement;

1.1.23 "**Pool Account**" means the account established and maintained by TransKarachi number for purposes of, among other things, of receiving funds from Card Top-Ups in accordance with clause 5.1.2.;

1.1.24 "**Prohibited Act**" means:

(a) offering, giving or agreeing to give to a Public Official a gift or consideration of any kind as an inducement or reward for:

a. doing or not doing (or for having done or not having done) any act; or

b. showing or not showing (or for having shown or not shown) favour or disfavour to any person,

in relation to the award or performance of the Agreement or any other agreement with TransKarachi; or

(b) entering into an agreement for which commission has been paid or has been agreed to be paid by the Operator or on its behalf, or to its knowledge, unless before the relevant agreement is entered into, particulars of any such commission and of the terms of any such agreement for the payment thereof have been disclosed in writing to TransKarachi; or

(c) committing any offence under the Applicable Law creating offences in respect of fraudulent acts; or

(d) defrauding, attempting to defraud or conspiring to defraud TransKarachi;

1.1.25 “**Public Official**” means an official or employee of a government (whether Federal or provincial) owned or controlled enterprise or any Regulatory Body and shall include any individual defined as a public official in an Applicable Law;

1.1.26 “**Receiving Party**” means the Party receiving Confidential Information from the Disclosing Party;

1.1.27 “**Regulatory Body**” means any governmental, semi-governmental, administrative, fiscal or judicial ministry, department, commission, authority, tribunal, agency, municipality or body, and shall include the provider of electricity, gas, water, wastewater, telecoms and other such public services, and any body with a regulatory function under the Applicable Law;

1.1.28 “**Relevant Time**” means [•] hrs PKT each calendar day;

1.1.29 “**Single Journey Sales**” means amounts received as payment from a passenger for a single journey and/or payment that is other than a Cards Top-Up payment;

1.1.30 “**Single Journey Tickets**” means any travel right, printed or any medium with visual identifiers, that can be obtained by a passenger in return for money to use the System;

1.1.31 “**SCSP Fee**” means the fee payable to the System Control Service Provider by TransKarachi under the System Control Service Provider Agreement;

1.1.32 “**SCSP Sales Receipt Account**” means the account established and maintained by the System Control Service Provider for purposes of, among other things, receiving the funds generated from Card Top-Ups and Single Journey Sales in accordance with clause 4.1.

1.1.33 “**Service**” or “**Services**” means the fund management services to be rendered by the Fund Manager pursuant to the Agreement;

1.1.34 “**Surviving Provisions**” means clauses 1 (Preliminary Matters); 11 (*Breach and Termination*); 12 - 34 (*Part D - Miscellaneous Matters*) and this Annex A;

1.1.2 “**System**” means the bus rapid transit system in Karachi known as Karachi Sustainable BRT Corridor System and where applicable is specific to the Karachi Red Line BRT System;

1.1.35 “**System Control Service Provider Agreement**” means the agreement made on [•] 2018 between the System Control Service Provider and TransKarachi whereby the System Control Service Provider agreed to render certain services to TransKarachi in relation to the System;

1.1.36 “**Termination Date**” means the twelfth (12th) anniversary of the Effective Date or the date on which an earlier termination pursuant to the terms of the Agreement takes effect;

1.1.37 “**TransKarachi Own Account**” means the account established and maintained by TransKarachi for purposes of receiving payments and/or transfers due to TransKarachi pursuant to clause 7.1.4.

2. Interpretation

2.1 In the Agreement:

1.1.1 in the event of conflict between the Annexes and the provisions of this Agreement (excluding the Annexes), the provisions of the Agreement shall prevail;

1.1.2 any definition in this Agreement, shall bear the same meaning and apply throughout this Agreement including Annexes hereto, unless otherwise stated or inconsistent with the context in which it appears;

1.1.3 the singular includes the plural and vice versa;

1.1.4 a reference to a statutory provision includes any subordinate legislation made from time to time under that provision and includes those provisions as amended, consolidated, re-enacted or replaced from time to time;

1.1.5 a reference to a document includes the document as modified from time to time and any document replacing it, in each case in the manner permitted by the Agreement;

1.1.6 a reference to a gender includes the other genders;

1.1.7 a reference to any government agency or body, if that agency or body ceases to exist or is reconstituted, renamed or replaced or has its powers or functions removed (“defunct body”), means the agency or body that performs most closely the functions of the defunct body;

1.1.8 a reference to an “agent” shall mean any person with a contractual relationship with a Party and carrying out activities or obligations on behalf of that Party;

1.1.9 a references to a “subsidiary” shall be a references to a subsidiary as defined in the Companies Act, 2017;

1.1.10 references in this Agreement to “clauses” or to “Annexes”, are to clauses of and Annexes to this Agreement;

1.1.11 references to notices or requests made or received by any of the Parties shall, unless expressly provided otherwise in this Agreement, refer to notices or requests in writing;

1.1.12 references to “agree” or “agreed” shall require the agreement to be recorded in writing and signed by the authorised representatives of the Parties;

1.1.13 no rule of construction shall be applied to the disadvantage of a Party to this Agreement because that Party was responsible for or participated in the preparation of this Agreement or any part of it;

1.1.14 unless otherwise provided, any number of days prescribed shall be determined by excluding the first and including the last day or, where the last day falls on a day that is not a Business Day, the next succeeding Business Day;

1.1.15 references to day/s, month/s or year/s shall be construed as Gregorian calendar day/s, month/s or year/s, as the case may be;

1.1.16 if a definition imposes substantive rights and obligations on a Party, such rights and obligations shall be given effect to and shall be enforceable, notwithstanding that they are contained in a definition;

1.1.17 a reference to a Party includes that Party’s successors and permitted assigns;

1.1.18 the use of the word “including” followed by a specific example/s shall not be construed as limiting the meaning of the general wording preceding it and it shall be construed as if it were followed by “without being limited to”.

KARACHI BUS RAPID TRANSIT PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 - DRAFT CONTRACTS

SYSTEM CONTROL AND SERVICE PROVIDER – SECTION 6 – ITS INTRO AND REQUIREMENTS

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

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1. Glossary

1.1 Abbreviations and Terms

The following abbreviations and terms are used throughout this functional/technical specification document and shall have the meaning attributed to it in this Glossary.

Please note that terms used in this document will at first be accompanied by an associated abbreviation in brackets where after the abbreviation will apply.

Table 1: Glossary

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
AMS	Asset Management System
AP	Access Point
API	Application Program Interface
AVL	Automated Vehicle Location System
AVM	Automated Vehicle Monitoring System
BRT	Bus Rapid Transport
BoQ	Bill of Quantities
CCTV	Closed Circuit Television
DVR	Digital Video Recorder
DRCM	Design Requirements Compliance Matrix
EFC	Electronic Fare Collection
ERP	Enterprise Resource Planning
FAT	First Units Acceptance Test
FMS	Fleet Management System
GNSS	Global Navigation Satellite System
GoS	Government of Sindh
GUI	Graphical User Interface

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
ISO	International Organization for Standardization
ITS	Intelligent Transport System
ITxPT	Information Technology for Public Transport
KPI	Key Performance Indicator
L0	Level 0
L1	Level 1
L2	Level 2
L3	Level 3
L4	Level 4
LAN	Local Area Network
NTP	Notice To Proceed
OAT	Overall Acceptance Test
OCC	Operation Command & Control Centre
OEM	Original Equipment Manufacturer
PTA	Public Transport Authority
PTO	Public Transport Operator
RFID	Radio-Frequency Identification
RFP	Request for Proposal
RTPI	Real Time Passenger Information
SAT	System Acceptance Test
Contractor **(or ITS Contractor)**	The successful bidder who will enter into the Contract with the Employer to provide all Goods and Services Obligations required in terms of this Request for Proposal.
City	Karachi

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
Employer	Sindh Mass Transport Authority

2. Introduction

2.1 Purpose of Agreement

2.1.1 An Intelligent Transportation System (ITS) is an advanced application which, without embodying intelligence as such, aims to provide innovative services relating to modes of transport management and enable passengers to be better informed and make safer, more coordinated, and 'smarter' use of transport networks.

2.1.2 The purpose of this RFP is to enable the identification and selection of suitably competent and experienced ITS suppliers, system integrators, manufacturers and operators to design, supply, install, operate and maintain a comprehensive ITS solution for the Government of Sindh (GoS) in Karachi, for the BRT Red Line.

2.1.3 The intended audience of this document are the respondents to the Bidding Documents for this equipment and services. Prospective bidders and the winning bidder are referred to as the Contractor (or ITS Contractor) in this document.

2.1.4 This RFP also serves to guide and assist service providers/bidders in their preparation of detailed proposals in response to this RFP, providing the requirements related to the supply of the ITS goods and services solution to be proposed.

2.1.5 All of the equipment purchased under the contract will be in the ownership of the Employer and used specifically for BRT system (or otherwise upon approval by the Employer).

2.2 Project Overview

2.2.1 The objective of the project is to provide cost-efficient, qualitative, customer friendly ITS goods and services for the Red Line of the BRT system of the City of Karachi.

2.2.2 As systems in which information and communication technologies are applied in the field of road transport, the BRT system will include infrastructure, vehicles and operators, management and mobility management and may involve interfaces with other systems and modes of transport.

2.2.3 The Contractor is to deliver the goods and services at the prescribed high-level of output quality so as to meet or exceed the minimum requirements detailed.

2.2.4 The BRT system is comprised of (a) approximately 24.2-kilometer (km) of a mass transit corridor (from Malir Cantt to Regal Chowk, via the University Road); (b) a 2.4-km section of common corridors along with other BRT lines that can be merged in the city center; (c) an off-corridor direct and feeder service routes connecting the corridor to communities.

2.2.5 The BRTS being established in Karachi is expected to cater for the large population groups in the city, with as many as 300,00 passengers per day being served by the Red Line BRT routes. To ensure efficient operation of the mass system, an Integrated ITS needs to be established. The former includes application of advance information processing, communications and management strategies in an integrated manner to improve the functioning of the transportation system.

2.2.6 2.2.6. The following figure gives a draft overview of the BRT system infrastructure to be delivered and its accommodation within the other planned mass transit corridors.

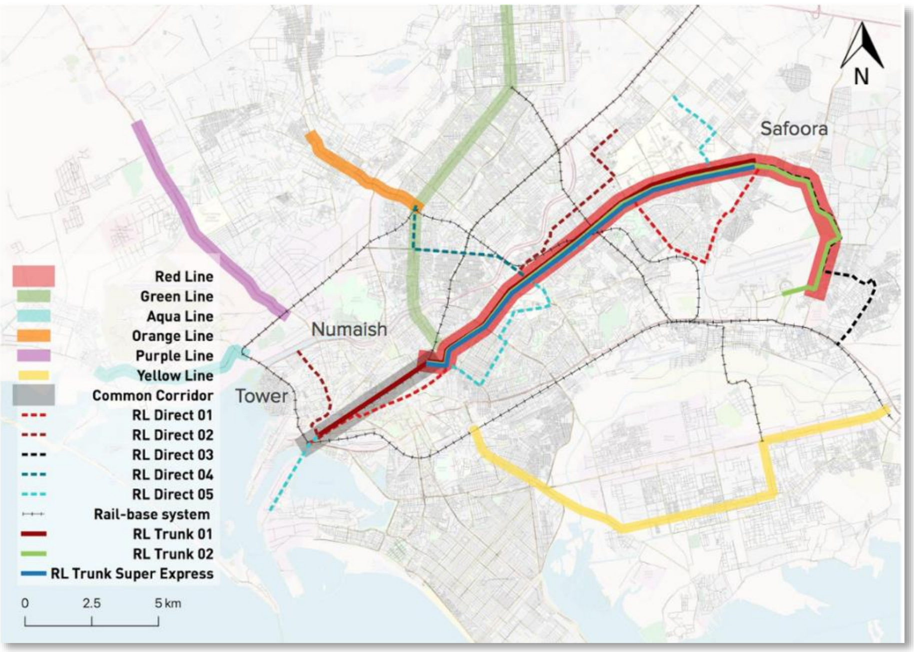


Figure 1 Route network of the first phase of the BRT system.

2.2.7 BRT stations, BRT vehicles depots, the Operational Control Center, Test and Training Centre and Data Room will be made available by the Employer inclusive of power generators, escalators, elevators, automatic station doors (also known as platform screen doors), and utilities, except for the ITS equipment to be supplied by the Contractor.

2.2.8 Being part of the ITS components, communication networks, including active and passive components, will be provided by the Contractor.

2.2.9 Electrical equipment and PVC ducting for all necessary equipment for the ITS operation is to be provided by the Contractor.

2.3 Scope of Works

2.3.1 The ITS equipment and software comprise of all ITS components deployed at the Operational Control Center, at the BRT stations, along the corridor, at the depots, and on-board the BRT vehicles, including but not limited to:

a) Fare ~~System~~Collection;

b) Fleet Management;

c) Real Time Passenger Information (RTPI);

d) Communication Network;

e) Security and Surveillance: The Contractor must provide security services to support the end-to-end security of the ITS;

f) ITS Equipment on-board BRT Vehicles;

g) Customer service. The Contractor must provide customer services on all ITS activities under the scope of the Contractor;

h) Asset Management System (AMS);

2.3.2 These items must be proven to operate in a fully integrated manner and must provide solutions for external interfaces to other systems as described herein. In addition, the deployment shall allow for expansion over time, including increases in the number of vehicles, stations, operators, and the addition of enhanced or improved functionality.

2.3.3 A complete description of the inter-relationships between the ITS and other systems or services will be supplied by the Contractor.

2.3.4 It shall be the responsibility of the Contractor to build a complete system and provide all equipment, hardware, software and services necessary to ensure a fully functioning system as described in this RFP. This requirement includes any permits, authorizations, inspections, designs, licenses, way leaves and/or other activities necessary to install any equipment on vehicles or at the Operational Control Center. The Employer will reasonably assist the Contractor in obtaining the required clearances, and approvals but this will not in any way release the Contractor from providing a complete and operational system that meets the requirements identified in this document.

2.3.5 Each sub-system with its specifications and requirements (technical, equipment, maintenance, services) has been detailed in separate documents.

2.3.6 In order to facilitate the understanding of the ITS equipment functions and better organize the features to be supplied, this RFP considers the following 5 hierarchical levels:

2.3.7 [**Level 0**] Fare Media (not part of the Contractor Scope of Works): Smartcards and Smartphones are expected fare medias to be made available to passengers. These Fare Medias are the physical representation (embodiment) associated to a Fare Product, which is a transport service entitlement that will let passengers to get their right-to-travel after successful validation. The Figure 2 illustrates the aforementioned features within Level 0:

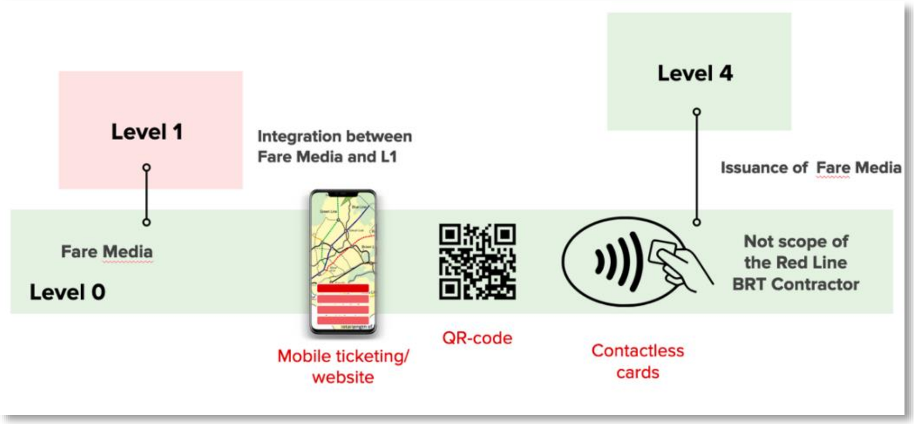

Level 1
Integration between Fare Media and L1
Level 4
Issuance of Fare Media
Fare Media
Level 0
Not scope of the Red Line BRT Contractor
Mobile ticketing/ website
QR-code
Contactless cards

Figure 2 Level 0 diagram with fare media and integration with other levels.

2.3.8 [**Level 1**] Stationary and On-Board equipment: ITS equipment to be installed at stationary locations, like depots or stations, handheld devices and equipment to be mounted on-board the BRT vehicles. The Figure 6 llustrates the aforementioned features within Level 1:

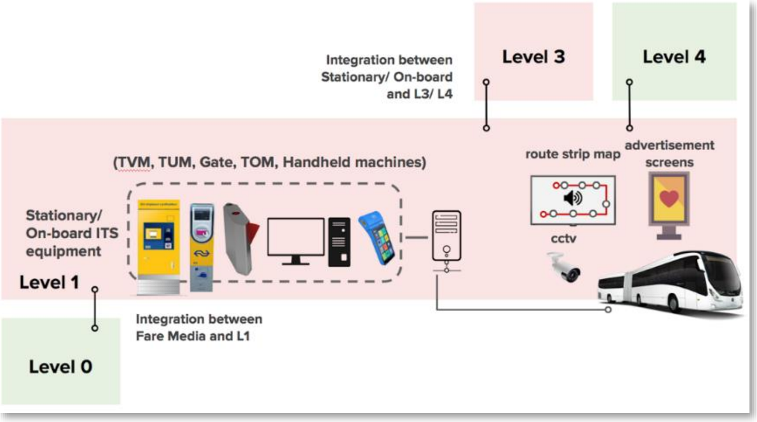

Integration between Stationary/ On-board and L3/ L4
Level 3
Level 4
(TVM, TUM, Gate, TOM, Handheld machines)
route strip map
advertisement screens
Stationary/ On-board ITS equipment
cctv
Level 1
Integration between Fare Media and L1
Level 0

Figure 3 Level 1 diagram and its points of integration with the other levels.

2.3.9 [**Level 2**] Network and Data concentration equipment: optionally, depending on the solution of the EFC Contractor, specific equipment may collect information at stations and/or depots from Sales, Validation and Inspection Equipment, consolidating and transferring the data to the back office systems, and controlling or managing Level 1 devices. The Figure 4Figure 2 illustrates the aforementioned features within Level 2:

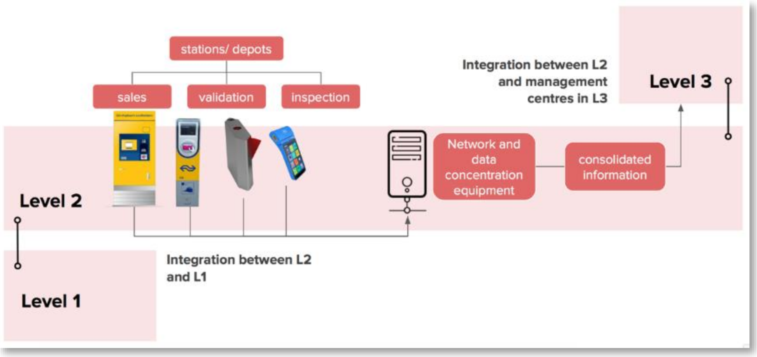

stations/ depots
sales
validation
inspection
Integration between L2 and management centres in L3
Level 3
Network and data concentration equipment
consolidated information
Level 2
Integration between L2 and L1
Level 1

Figure 4 Level 2 diagram and its points of integration with the other levels.

2.3.10 [**Level 3**] L3 ITS Management Center: The servers and software to provide management and oversight of the ITS System that will enable Contractor to manage its ITS equipment and services. This includes the necessary hardware (like networking equipment) and software for interfacing with other stakeholders. The L3 ITS Management Center will be operated from the OCC. The Figure 5 illustrates the aforementioned features within Level 3:

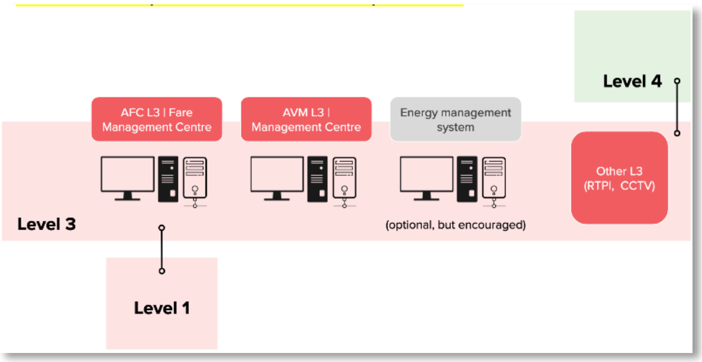

Level 4
AFC L3 | Fare Management Centre
AVM L3 | Management Centre
Energy management system
Other L3 (RTPI, CCTV)
Level 3
(optional, but encouraged)
Level 1

Figure 5 Level 3 diagram and its points of integration with the other levels.

2.3.11 [**Level 4**] L4 ITS Management Center (not part of the Contractor Scope of Works): The servers and software to provide management and oversight of the ITS System that will let the PTA administer the whole BRT interoperable ITS System, including other BRT Lines.

2.3.12 The following picture illustrates the aforementioned 5 levels architecture and the scope of works of the BRT Red Line Contractor.

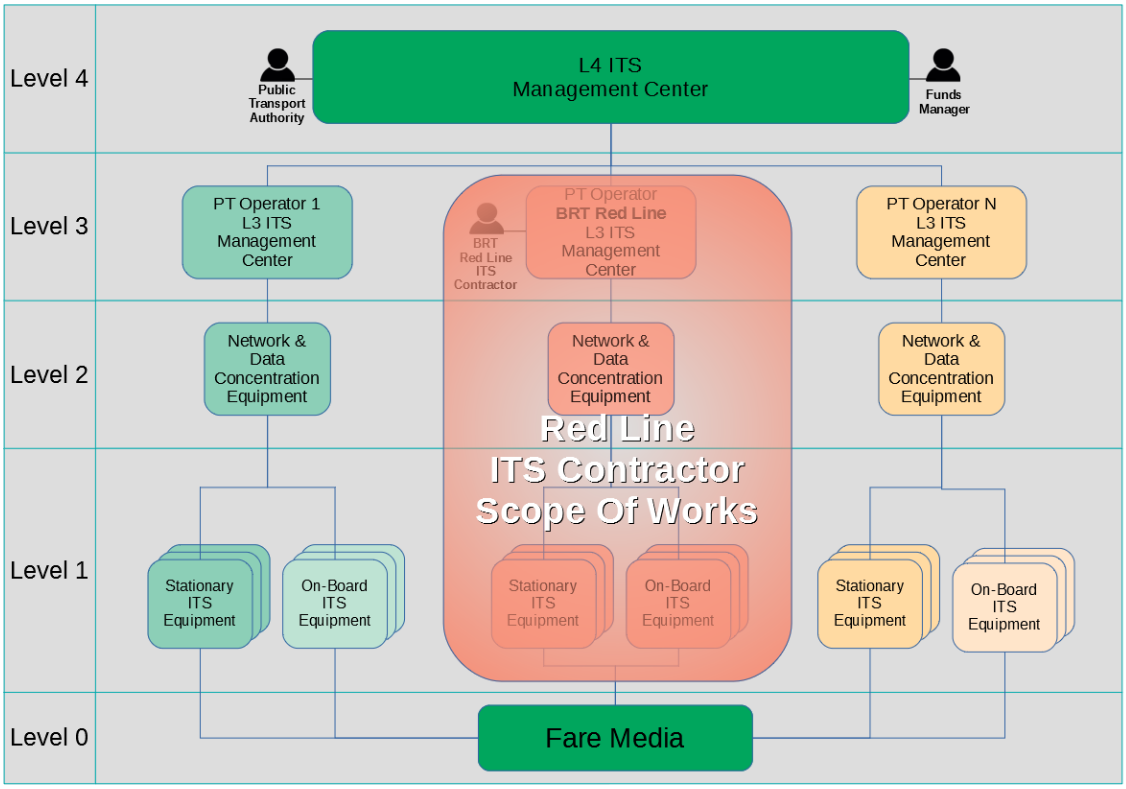

Level 4
Public Transport Authority
L4 ITS Management Center
Funds Manager
Level 3
PT Operator 1 L3 ITS Management Center
BRT Red Line ITS Contractor
PT Operator BRT Red Line L3 ITS Management Center
PT Operator N L3 ITS Management Center
Level 2
Network & Data Concentration Equipment
Network & Data Concentration Equipment
Network & Data Concentration Equipment
Red Line ITS Contractor Scope Of Works
Level 1
Stationary ITS Equipment
On-Board ITS Equipment
Stationary ITS Equipment
On-Board ITS Equipment
Stationary ITS Equipment
On-Board ITS Equipment
Level 0
Fare Media

Figure 6: Diagram illustrating the 5 levels ITS architecture.

2.3.13 The key activities associated with the supply of the ITS equipment and services for each of these components will be:

a) ITS System Design aligned with the contractual requirements.

b) Provision of the specified equipment and software following the ITS System Design and requirements

c) Installation, testing, and commissioning of the equipment and software

d) Delivery of capacity-building training to both employees of the agreement and employees of the Employer

e) Operation and maintenance services of the equipment and software commissioned by the Contractor and other services mentioned in Contract

f) Management and operation of the ITS equipment and services for the full period of the contract.

2.3.14 After installation and commissioning, the ITS components will be taken into operation by the Contractor. It is the responsibility of the Contractor to ensure that these services are provided until the end of the term or until earlier termination, as the case may be.

2.3.15 Additionally this RFP details the services to be provided under the Karachi BRT Red Line project. The core components of this scope of work will include the provision of all public transport related services that will be supported by the ITS equipment, including but not limited to:

g) OCC Management: managing and staffing the Red Line L3 Management Center in the OCC.

i) Station Management: Passenger services, Security, Cleaning and landscaping, Reporting of faults, incidents, and emergencies.

j) Personnel and Human Resource Management;

k) Monitoring and Reporting, including maintenance of authorized personnel and audit rights, contract management functions, and provide automatically generated reports ; and

l) Maintenance of all equipment and software delivered under the scope of this contract in accordance of the maintenance plan, including at least: preventive maintenance and corrective maintenance.

2.3.16 The Contractor shall appoint enough employees with the necessary skills, knowledge, experience and qualifications to ensure that it is and remains able to discharge all its operational and maintenance obligations in terms of the Contract timeously and effectively. The Contractor shall at its sole cost and expense, ensure that all its staff members are responsible for operational and maintenance functions, undergo the necessary ongoing training and/or instructions and evaluations to ensure continuous compliance with this requirement.

2.3.17 The Contractor will be responsible for the servicing and maintenance of the ITS equipment and software for a period of 10 (ten) years, which period will consist of an initial 2-year warranty period followed by an 8-year maintenance period, collectively referred to as the Warranty and Maintenance Period. The Contractor will maintain the ITS equipment in optimal operating condition during the entire 10-year period.

2.3.18 The ITS Service Provider will ensure that all maintenance will be conducted in such a manner so as to allow the continuance of all ITS Services that are not directly impacted by the maintenance activity.

2.3.19 No preventive maintenance will be permitted during Operations Hours and thirty (30) minutes immediately prior to start of Operations Hours (Operational Hours), provided that preventive maintenance on Bus ITS equipment will be allowed during off-peak hours at depots and staging areas, subject to reasonable approval by the Employer.

2.3.20 Corrective maintenance will be permitted at all times.

2.3.21 Where there is a difference between the main contract’s defects and liability requirements and this specification, the longer time period shall apply.

2.3.22 All guarantee and warranty work must be done at no cost to the Employer.

2.3.23 This RFP defines the KPIs to be maintained by the Contractor for each ITS component during the Warranty and Maintenance Period and lists the penalties that will be imposed in case of non-compliance with the minimum performance requirements.

2.3.24 The Contractor shall establish, implement, and manage the monitoring and reporting of KPIs for the ITS.

2.3.25 It must be noted that, where the Contractor is aware of systems and services that are required for the effective operations and maintenance of the ITS equipment and software, but these are not specifically referred to or indicated in this RFP document, the Contractor shall include these systems and services to be an integral part of the required ITS Goods and Services Obligations.

2.3.26 Bidders must state any specific prerequisites, especially technical ones that must be addressed for achieving the required functionality of the proposed solution, even if it is deemed not in scope as stipulated above.

2.4 Role of Employer and Other Service Providers

2.4.1 The Employer is the responsible authority and acts as the licensed operator of the BRT System.

2.4.2 The Employer will manage the following subcontracts in order to ensure BRT operation:

a) A contract to build the BRT infrastructural works through another Implementing Agency;

b) A contract to supply the BRT vehicles, inclusive of drivers’ training and two years of maintenance supervision;

c) Two or more contracts with Vehicle Service Providers, operating and maintaining the vehicles. The Vehicle Service Providers operate in accordance with instructions provided by the Contractor and are remunerated per kilometre driven.

d) A contract to procure ITS equipment and services (the subject of this bidding document) on behalf of Employer;

e) A contract to procure and operate bicycle sharing services

f) A contract to procure and operate feeder services through electric three-wheelers;

g) A contract to manage the commercial shops, advertising, and parking plazas that are integrated with the system.

2.5 RFP Specifications Approach

2.5.1 This RFP comprises ITS output specifications that contain

a) Functional requirements: a description of the relevant business processes, and what the system and its components are expected to deliver to achieve them.

b) A technical concept that provides a high-level outline of the desired approach.

c) Core requirements that will shape the eventual solution: These may include, for example, interoperability requirements with existing systems, the standards to be adopted, and key interfaces - but should not be expected to define detailed technical requirements so as to not preclude alternative solutions being proposed

2.5.2 This approach enables the Employer to retain an open mind regarding the final technical solution, but still shape it to ensure that it delivers the necessary outcomes.

2.5.3 The Contractor shall specify the detail of the technical specifications and procedures required to ensure the operations and services requested in this RFP.

2.5.4 The Contractor will be responsible to evaluate conveniently factors to consider in the design of the equipment, including environmental, according to the expected operational use and location of the equipment, selecting more demanding requirements when necessary.

2.5.5 The (prospective) Contractor must verify and ensure that the systems proposed comply with the output specifications and can meet the KPIs.

2.5.6 The (prospective) Contractor shall develop and validate a requirements Traceability Matrix that will map all RFP requirements to its bid submission.

2.5.7 The Traceability Matrix shall show the traceability of the detailed requirements and will be used to verify that all business solution requirements are mapped to solution component designs. It will also be used to identify the source of requirements from a design perspective.

2.5.8 During the project implementation, the Contractor will be responsible for the development, delivery and maintenance of the Traceability Matrix, validating and confirming that business/solution requirements are complete and confirm that requirements are mapped to solution design elements

3. Guiding Principles and Requirements

3.1 Conformance to Local, Provincial and National Laws

3.1.1 The Contractor shall adhere to and follow the principles and requirements described in this RFP, and shall be responsible for abiding by all the laws of the land especially the labor laws, in relation to those who are employed by the Contractor.

3.2 Requirements Precedence

3.2.1 The requirements defined in this section apply to all subsystems, unless more specific requirements are defined in the corresponding sub-system requirements. In case of any apparent conflict, the sub-system requirements will take precedence over the overall requirement.

3.3 General Requirements

3.3.1 The ITS equipment will be designed to provide a useful life of at least ten years.

3.3.2 All equipment will be designed for use in the public transport industry, with specific attention to ergonomics, reliability, efficiency, and safety for passengers, operators, maintenance personnel and other system users.

3.3.3 All ITS equipment will have an ergonomic design, free of rough surfaces, sharp angles, or points, or any element which may cause damage to Passengers.

3.3.4 Information visually presented to passengers will be displayed using the following languages:

a) Urdu; and
h) English.

3.3.5 All hardware equipment shall carry industry standard certifications from UL (Underwriter Laboratories) or similar, and international certification schemes such as CE Marking, European Telecommunication and Standardization Institute (ETSI), etc., to ascertain that the equipment have been manufactured and certified based on international standards.

3.3.6 The equipment shall also comply with all relevant local electrical regulations and local power supply authority's requirements.

3.3.7 Equipment furnished under these specifications will be the latest model in current production, as offered to commercial trade, and shall conform to quality workmanship standards and use materials consistent with public transport industry requirements.

3.3.8 All equipment must be standard devices which are produced with equivalent features by at least two different suppliers.

3.3.9 All the equipment offered under these specifications will be new (used, shopworn, demonstrator, prototype, re-manufactured, reconditioned, or discontinued models are not acceptable for supply under this contract).

3.3.10 The Contractor will make required site improvements and provide all required structures, hardware, brackets, cabling, wiring, and services for equipment or elements to be installed at all sites.

3.3.11 All external screws, nuts, and locking washers will be stainless steel or an approved alternate non-corrosive material; no self-tapping screws shall be used unless specifically approved.

3.3.12 All parts will be made of corrosive resistant material, such as plastic, stainless steel, anodized aluminum or brass, resistant to standard lubricants and cleaning solvents

3.3.13 Equipment will be designed to prevent unauthorized access, and to facilitate authorized access.

3.3.14 Standard, commercially available components will be used wherever possible.

3.3.15 All external connectors will be watertight and designed for use in a mobile environment subjected to dirt, water, oil and cleaning solvents.

3.3.16 The Contractor will include reasonable provisions to protect all equipment and components from common vandalism and physical abuse as may be expected on buses and at stops.

3.3.17 System components must be identical in mounting characteristics and inter-unit cabling across the entire fleet and on all stations, so that a replacement piece of equipment is installable without modification in any of the vehicles or stations for which it might be used.

3.3.18 Any retrofit or post-delivery change to one item of one type of equipment, shall be reviewed by Employer and upon approval, changes shall be made identically to all units.

3.3.19 Equipment and sub-components will be identified by a part number and/or serial number, permanently and legibly affixed directly to the surface of the unit.

3.4 Asset Management System

3.4.1 In order to ensure the quality of the ITS maintenance works The Contractor shall implement an AMS to ensure the Contractor’s assets are used in the most efficient manner, enhancing its profitability, planning and achieving quality objectives:

a) The main objective of the AMS will be to manage the Contractor’s assets installed at all sites through an asset inventory and in accordance with the Asset Management Plan to be issued by the Contractor.

i) The AMS will have the capability to support the asset inventory data, spare parts lists, identification of the defects or failures occurred during the asset life, and indicate the asset status, their renewal or disposal.

j) The AMS will control and monitor the maintenance activities subject to appropriate levels of verification and validation to ensure that maintenance plans are correctly applied and remain fit for the purpose.

3.4.2 The Asset Management System may utilize human readable and machine-readable RFID tags to ease identification of assets.

3.4.3 The Asset Management System will provide an API for integration with an ERP system to be provided by the Employer.

3.5 General On-Board Equipment Requirements

3.5.1 On- Board ITS equipment design shall consider that BRT Vehicles will be compliant with the minimum requirements of the public standard Information Technology for Public Transport (ITxPT) version 2.0 or version 2.1.

3.5.2 The BRT Vehicle manufacturer will supply the vehicles including:

a) On-board Backbone IP Network;

b) On-board Passenger IT Network & Passenger IP Wireless AP;

c) 10/100Base-T Ethernet switch (M12 D-coded 4 pins connectors) with maintenance Ethernet plug;

d) Power supply network (from vehicle side);

e) Vehicle manufacturer network (CAN J1939 for bus);

f) Bus-FMS interface (for bus);

g) FMStoIP or VEHICLEtoIP Gateway;

h) Vehicle Communication Gateway (VCG), including WiFi and 4G/5G connectivity;

i) Communication antennas;

j) GNSS geo-location module;

k) Advanced Vehicle Monitoring System (AVMS);

l) CCTV Cameras;

m) Cabling and connectors;

n) ITxPT ITS enclosure;

o) Panic Alarm Switch;

p) Integration with platform doors;

3.5.3 The Contractor will supply the following on-board functions:

a) Driver Terminal: including touch screen that will facilitate driver’s interaction with the ITS equipment on-board.

b) Real Time Passenger Information: including Internal Dynamic Passenger Information screens, External Dynamic Passenger Information Screens, passengers/driver speakers and microphone.

c) Fleet Management: AVL On-board Unit.

d) Automated Fare Collection: On-Board Validators;

e) CCTV:DVR;

f) UHF/VHF communication system;

g) SIM cards for data and voice communications, and any additional communications and networking equipment that may be required;

h) Any other elements identified by the Contractor to successfully perform the operation of the BRT vehicles.

3.5.4 Cables and connectors will be compliant with the standard ITxPT 2.0.

3.5.5 On-board components will have an operating voltage between 10 and 32 VDC.

3.5.6 The following chart summarizes the components to be supplied by the BRT Vehicle Manufacturer, in green color, and the components to be provided by the Contractor, in red color.

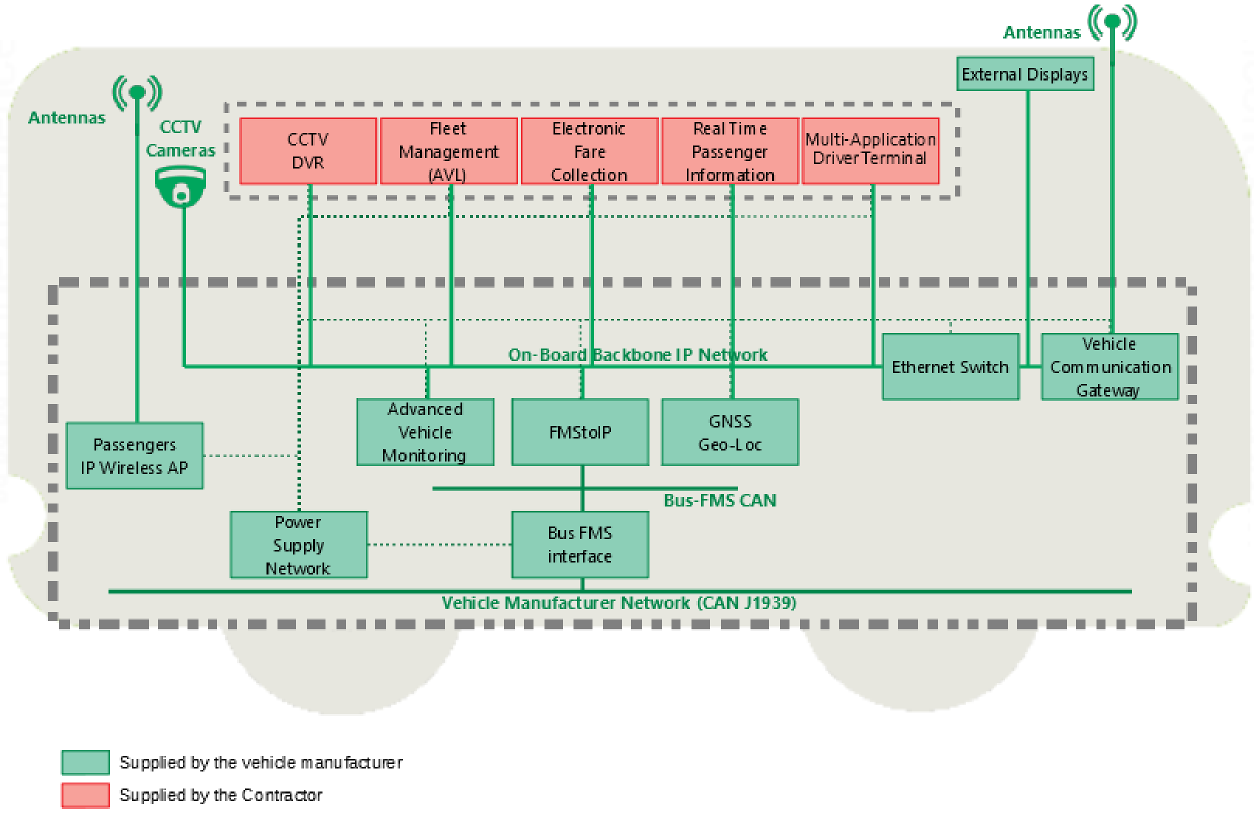

Antennas
External Displays
Antennas
CCTV Cameras
CCTV DVR
Fleet Management (AVL)
Electronic Fare Collection
Real Time Passenger Information
Multi-Application Driver Terminal
On-Board Backbone IP Network
Ethernet Switch
Vehicle Communication Gateway
Advanced Vehicle Monitoring
FMStoIP
GNSS Geo-Loc
Passengers IP Wireless AP
Bus-FMS CAN
Power Supply Network
Bus FMS interface
Vehicle Manufacturer Network (CAN J1939)
🟩 Supplied by the vehicle manufacturer
🟥 Supplied by the Contractor

Figure 7: On-Board Equipment Overview

3.5.7 All on-board components will comply with the following minimum Electrical, Climatic, Mechanical, Ingress Protection and Electro Magnetic Compatibility standards (or equivalent):

Category	Procedure & Minimum Requirement
Electrical	ISO7637-2 Level III; ISO16750-2 Level E (10V/32V for supply voltage)
Climatic	ISO16750-4 (Code A), and IEC60068-2
Mechanical, Vibration, Mechanical Shock	ISO16750-3 Level D; IEC60068-2
Ingress Protection	ISO20653 IP40
Electro Magnetic Compatibility	2009/19/EC(72/245/E/C) E-marking (worldwide); ECE R10 (minimum applicable revision)

Category	Procedure & Minimum Requirement
Fire	ECE R118 E-marking or UL94 Level V0

Table 2: Minimum Electrical, Climatic, Mechanical, Ingress Protection and Electro Magnetic Compatibility requirements

3.5.8 The requirements stated in the previous table do not replace, in any case, additional regulations or any additional Vehicle Manufacturer requirements.

3.5.9 The Contractor shall indicate full operational and quiescent power drain for each on-board component proposed.

3.5.10 Operation of equipment shall not be affected by electromagnetic effects present during normal public transport operations.

3.5.11 Operation of equipment shall not affect or be affected by other vehicle components, such as engine ignition, or other on-board equipment including vehicle power supplies, radios, automatic vehicle identification systems, fare systems, and on-board data collection and processing equipment.

3.6 Stationary Equipment General Requirements

3.6.1 The ITS Stationary Equipment casing will be built in such a way that they are robust, easy-care, and sufficiently protected against dust liquid splashes.

3.6.2 Casings will be resistant to impacts, corrosion and heat.

3.6.3 The casings of equipment outside secure data centers shall have at least physical characteristics equivalent to a stainless steel thickness of 1,5 mm and should have no joints in moving parts wider than 2 mm.

3.6.4 Surfaces will be resistant to scratching and dirt.

3.6.5 Once a casing door is open, it will remain stationary.

3.6.6 All screws and hinges should be concealed.

3.6.7 Enclosures will contain an easily accessible master circuit breaker that will remove power from the equipment when tripped.

3.6.8 Circuit breakers will clearly indicate when they have been tripped.

3.6.9 The expected power supply for stationary components is 230 V, 50 Hz. The following deviations from these voltages and frequencies will not affect the function or safety of the equipment:

a) Voltage deviation tolerance: ± 10%
b) Frequency deviation tolerance: ± 5%

3.6.10 All enclosures, chassis, assemblies, panels, switch boxes, terminal boxes, and similar enclosures or structures will be grounded.

3.6.11 Protective grounding will be provided to ensure that all exposed metal equipment and metal fixtures are connected to a common ground point in the electrical cabinet.

3.6.12 All conductors within each enclosure will be installed free from metal edges, bolt heads, and other sharp or interfering points.

3.6.13 Cables will go into the equipment either through the base or through the back of the equipment, at the floor level (in this case the cables outside the equipment will be protected by a flexible sabotage-resistant metal tube).

3.6.14 Cables will have strain relief and be protected against kinking

3.6.15 Cable connections to electrical equipment will be designed in such a way that they are not loosened by the mechanical impacts and vibrations that occur during bus operations.

3.6.16 All plug-in connections should be vibration-proof and corrosion-proof.

3.6.17 All terminations and cables will be clearly indexed, labelled and schematically identifiable.

3.6.18 All wire labels will be non-metallic and will resist standard lubricants and cleaning solvents.

3.6.19 Stationary Equipment will be connected to the LAN through an Ethernet 10/100/1000 interface.

3.6.20 Outdoor enclosures must include any provisions necessary to maintain the internal equipment at the manufacturer's specified temperature and humidity ranges.

3.6.21 All outdoor components will comply with the following minimum fire standards (or equivalent:

a) UL94 Level V0; or
b) CE R118 E marking

3.6.22 Outdoor enclosures must be designed to prevent the entry of moisture during a rainstorm and to minimize the entry of dust. The Contractor must identify in its proposal any housing that may not meet these requirements, identifying alternative provisions to be incorporated to protect against moisture and dust, and specific installation requirements.

The following table summarizes the main stationary equipment environmental requirements.:

Minimum Environmental Requirements				
Aspect	**Outdoor** **(no roof)**	**Covered Outdoor** **(Open area, under a roof, no controlled temperature)**	**Indoor** **(Closed area, controlled temperature)**	**Handheld Devices**
Ingress Protection	IP 65	IP42	Not Applicable	IP 54
Operating Temperature	-20 ºC to 80 ºC	-5 ºC to 55 ºC	5 ºC to 35 ºC	-5 ºC to 55 ºC
Operating Humidity	20% to 85% non-condensing	20% to 85% non-condensing	20 % to 80 % non-condensing	20% to 85% non-condensing
Storage Temperature	-30ºC to 85ºC	-10 ºC to 60 ºC	0 ºC to 40 ºC	-10 ºC to 60 ºC

Table 3: Main Stationary Equipment Environmental Requirements.

3.7 Operations Control Centre

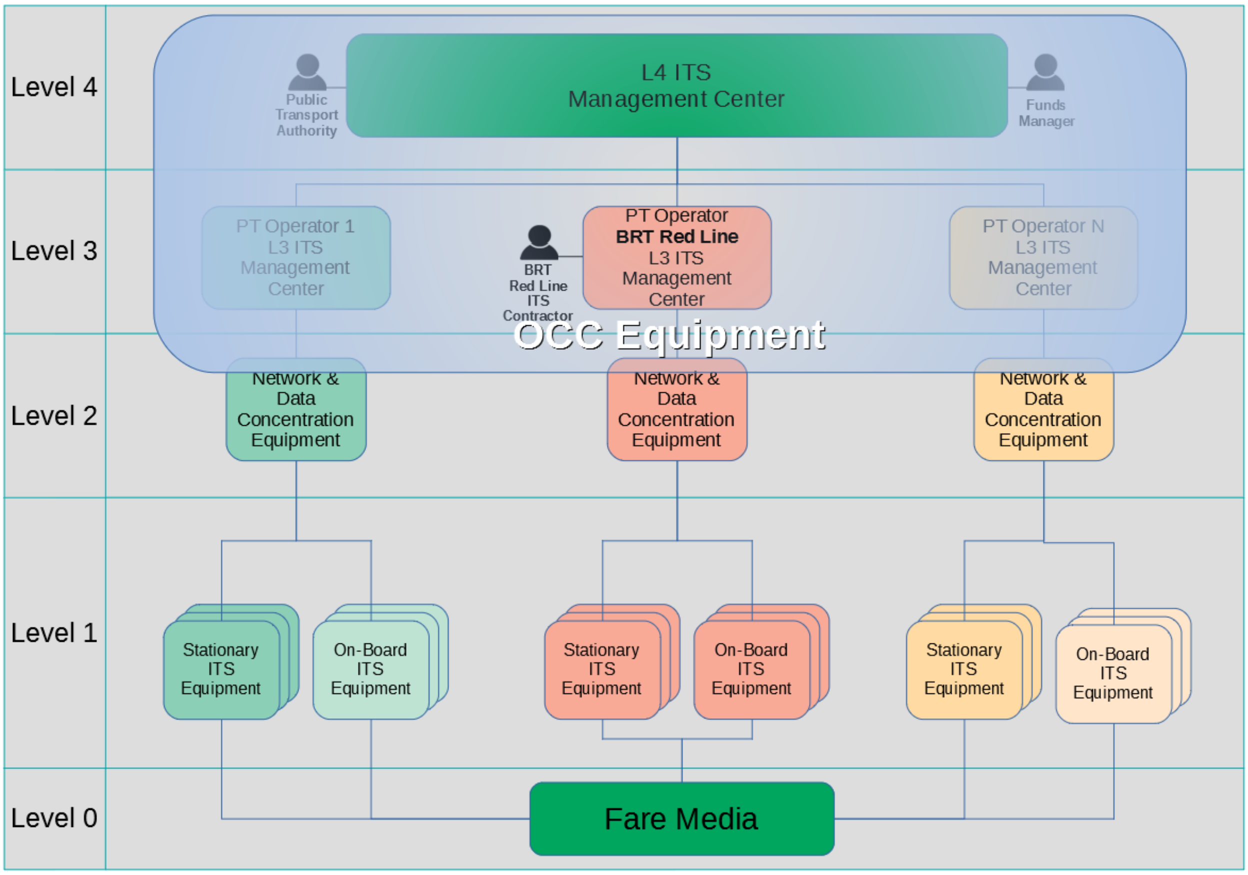
3.7.1 A central OCC, made available by the BRT Green Line, will enable to monitor the BRT network.

3.7.2 The Employer together with all BRT lines, including the BRT Red Line Contractor, will make use of the OCC Equipment to manage the complete BRT operations: passenger flows, fare management, fleet management, security, communication with stationary locations, etc.

3.7.3 The Contractor shall be responsible for managing and staffing the Red Line L3 Management Center in the OCC. The activities at the Operational Control Center under the remit of the Contractor encompass the management of the BRT Red Line and associated ITS.

3.7.4 This Central OCC will act as hub of storing / disseminating data / information from entire mass transit network of Karachi to stakeholders and operators (as necessary).

3.7.5 The OCC will have video walls to display relevant data and real-time information related with the fleet monitoring, CCTV Footage and others.


Level 4
Level 3
Level 2
Level 1
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L4 ITS Management Center
Public Transport Authority
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PT Operator BRT Red Line L3 ITS Management Center
PT Operator N L3 ITS Management Center
OCC Equipment
Network & Data Concentration Equipment
Network & Data Concentration Equipment
Network & Data Concentration Equipment
Stationary ITS Equipment
On-Board ITS Equipment
Stationary ITS Equipment
On-Board ITS Equipment
Stationary ITS Equipment
On-Board ITS Equipment
Fare Media

Figure 8: OCC Equipment

3.7.6 The L3 Contractor is expected to supply in the OCC the necessary equipment for the successful ITS Equipment operation, including but not limited to workstations, servers, software and networking equipment.

3.7.7 The L3 ITS Management Centre shall be operated using workstations in the Operational Control Center.

3.7.8 Each workstation shall include an ergonomic chair, a configurable height table, a VOIP phone and or VHF/UFC communications – refer to Schedule A - Goods.

3.7.9 Workstations will comply with the following minimum requirements:

Aspect	Minimum requirements
Type	Thin (small factor) workstation
OS	i. Microsoft Windows 10 Pro or better; and ii. Latest build including all service packs.
Memory	Sixteen (16) GB Random Access Memory (RAM)
Non-volatile storage	SSD
Processor	Intel or AMD introduced in 2019 latest
Connectivity	i. Gigabit Ethernet; and ii. Wi-Fi 802.11 a/b/g/n/ac.
Peripherals	i. USB Mouse ii. USB Keyboard iii. UPS iv. Original license for Microsoft Windows and MS Office v. Two (2) displays per workstation: a. At least twenty-four (24) inch b. HDMI/DisplayPort c. At least 1920 x 1080 pixels

Table 4: OCC Workstations Technical Requirements.

3.7.10 The L3 ITS Management Center (to be supplied by the Contractor), including the necessary functions provided by the Fare System, Fleet Management, Real Time Passenger Information, Security and Surveillance, must be able to support expansion up to at least eight hundred (800) vehicles, and fifty (50) stations.

3.7.11 The proposed ITS shall be able to cope with an increase of passenger volumes up to 100% of projected volumes (estimated ridership of 400,000 per day).

3.7.12 The proposed L3 ITS Management Centre will be designed to provide system designed to achieve a high availability of at least 99.5% during operating hours.

3.7.13 The Contractor shall survey the Operational Control Center environmental conditions and confirm that it is adequate to the technical and operational requirements.

3.7.14 The Contractor shall provide a data backup system for the L3 ITS Management Centre data archiving and recovery.

3.7.15 A disaster recovery location on a separate location or service will provided ensure continuity of critical business functions in case of failure in the OCC.

3.7.16 The Contractor will supply the tools, workstations, servers, software and networking equipment that will ensure the designated disaster recovery OCC fits the purpose of operating the Red Line ITS keeping all essential aspects of the business functioning despite significant disruptive events

3.7.17 As a minimum the following disaster recovery functionalities will be provided:

a) Disaster server in warm standby
b) Data synchronization every hour
c) Manually switch to realize failover
d) All connections will be re-routed automatically and are available without rebooting affected devices

3.7.18 The Contractor will implement the corresponding policies, including a Data Backup Plan and a Business Continuity Plan, to define the processes involved in maintaining the critical business components operational in case of disasters, security breaches, network faults and other man made or natural emergency situation.

3.8 KPI Monitoring

3.8.1 The Contractor shall implement the contractual obligations of all Employer's subcontractors (the Vehicle Operating Companies and the Contractor itself), enabling contract management in terms of contractual and the recommended indicators, against which the Vehicle Operating Companies' performances are accurately measured.

3.8.2 The KPI monitoring system will utilize the most basic raw data that is available as the input into the system. There shall be an unambiguous interpretation of the data. The Contractor will provide all data definitions.

3.8.3 It is required that dynamic data analysis is possible and the results can be produced on geographical overviews. Due to performance reasons it is allowed that data analysis is made available based on job-scheduling for overnight execution. Regular and standard performance indicators can be made available based on automatically generated reports, monthly, or per a defined period in time. Time scaling, output provision, and selections are required support functions in this 'contract management system'.

3.8.4 The KPI monitoring system shall be prepared to receive data from multiple Vehicle Operating Companies using standardized and open interfaces.

3.8.5 The KPI monitoring system shall at least provide reports according to the reporting requirement stipulated in Section VI - Schedule B – Services and cover the Vehicle Operating Companies' KPIs.

3.8.6 The KPI monitoring system shall provide a web-based interface so that the Employer can view all reports, dashboards, and historic data on-line.

3.9 Software Requirements

3.9.1 All software shall be the vendor's most current version in production at the time of installation.

3.9.2 All software shall contain version control numbers.

3.9.3 Adjustable, specific to this project, and configurable parameters shall not be hard-coded onto the source-code. These parameters shall be user modifiable.

3.9.4 Application software shall be portable, i.e., executables shall be transferable to other computers using the same hardware and operating system without any modifications or use of hardware key, unless otherwise approved by Employer.

3.9.5 All GUI response times shall be as fast as possible to make the user feel that the system is reacting instantaneously, meaning that no special feedback is necessary except to display the result.

3.9.6 By using the designated workstations (to be provided by the Contractor), after successful log-in, authorized users will be able to access to the available L3 ITS Management functions.

3.9.7 The L3 ITS Management Centre software to be supplied by the Contractor for each of the ITS sub-systems, will include a GUI software, preferable accessible through a common Web Browser (e.g. Firefox), that will make possible, only to authorized users accessing to the L3 ITS Management features.

3.9.8 Depending on the L3 ITS Management Center user ID profile rights, different configurable functions will be available to the user through the corresponding GUI. The features available to each user and user profile will be configurable.

3.9.9 L3 ITS Management Centre software GUI will include online help features.

3.9.10 Segregation of duties (e.g. ‘create’ and ‘release’ functions) will be implemented to improve operational effectiveness.

3.9.11 Sensitive system interaction will be logged and kept for audit purposes;

3.9.12 Time synchronization services will be implemented to ensure the same time and date is set all along the ITS equipment. An NTP-service shall be made available by the L4 ITS Management Centre.

3.9.13 It will be possible to define the Operating Hours, based on the start and end of service regardless of service extending past midnight.

3.9.14 Data transferred from a device or system shall not be purged or written over until at least one successful transfer is confirmed.

3.9.15 Features shall be provided to ensure that all system-created files are uniquely identified, and that no files are lost or missed during data transfer.

3.9.16 Verification features shall be provided to confirm that there have been no losses of data at any point in the system.

3.9.17 The system shall be capable of remote paging of software alarms, with an escalation process.

3.10 Remote Update

3.10.1 Release management shall be used to implement system changes in a logical order and to manage and control the implementation process.

3.10.2 It will be possible to update remotely all stationary and on-board ITS equipment firmware, software and data configuration necessary for operation, from the L3 Management Centre. Once a new update is set up in the L3 Management Centre, the update will be performed automatically and without further manual intervention.

3.10.3 Updates will be compressed before being transferred to the ITS equipment, making possible to send updated data only, e.g. when a new stop element has been added, only this element will be submitted and be added in the data supply of the dedicated component.

3.10.4 Stationary equipment updates will be transferred through LAN network.

3.10.5 On-board equipment updates will be transferred preferably through WiFi network available at Depots, however in case of emergency or high priority update, it will be possible to transfer updates through 4G or similar network.

3.10.6 Once an attempt to update at an ITS device is carried out, a log will be generated and reported to the corresponding L3 Management Centre including the specific version of each one of the software modules including at least when applicable the following data type: software version, firmware version and data configuration version.

3.10.7 It will be possible to send independently new versions of each data type separately, e.g. when fare data has been updated, only the fare data must be sent, without sending the current software version together with the new dare data.

3.10.8 The ITS will implement the necessary mechanism to enable scheduling updates, so firmware, software and data configuration updates can be transferred into the L1 ITS equipment in advance, before the actual activation date and time.

3.10.9 The ITS will support to store, in the L1 ITS stationary or on-board equipment, at least 2 different dormant (not yet activated) updates containing all the upgradable information of the corresponding equipment.

3.10.10 Once the configurable activation date and time is reached, the ITS equipment will be automatically updated minimizing any disturbance to the operation and especially to passengers.

3.10.11 The Contractor must test and implement security patches promptly after being issued by the vendors. All components using standard third-party software (e.g. Windows, databases, browsers, etc.) will be maintained up-to-date in terms of software/firmware releases and updates, keeping them aligned with their respective vendors' latest releases and support policies.

3.10.12 The Contractor will perform upgrades at a time that minimizes the impact to service delivery

3.11 General Integration Requirements

3.11.1 Red Line will operate as part of an integrated BRT system. For Contractor this means that integration is required between the ITS systems provided by (an agent of) the Employer and the ITS systems provided by the Contractor, including but not limited to the Fare System, the Fleet Management System, the Passenger Information Systems and the Security Systems and in the OCC provide by (an agent of) the Employer. The integration requirements and dependencies are detailed here.

3.11.2 The Contractor will operate Levels 1 -3 of all systems, and ensure integration with Level 0 and Level 4.

3.11.3 The Contractor shall refer to Schedule B – Integration, for the latest specifications and procedures for integration. This Schedule shall contain high-level information at bid submission, and will be updated as more detailed iterations become available. The final version shall be provided to Contractor at Actual Integration DD Date which shall be on or before Scheduled Integration DD Date.

3.11.4 Schedule B - Integration shall comprise at least the following:

3.11.4.1 Fare System

a) Fare media layout specification (contactless & QR)
b) Fare media communication specifications
c) SAM functional and technical specifications
d) Security Architecture
e) Level 1 functional specifications
f) User experience alignment and business rules
g) Specifications and communication protocols for Level 4 – Level 3 integration
h) User interface designs

3.11.4.2 Fleet Management System

a) Overview of Level 3 functions provided by the Level 4 system
b) Specifications and communication protocols for Level 4 – Level 3 integration

3.11.4.3 Real-time Passenger Information System

a) Specifications and communication protocols for Level 4 – Level 3 integration
b) User interface designs

3.11.4.4 Security and surveillance System

a) Specifications and communication protocols to integrate with OCC video wall and CCTV-feed storage
b) Video wall details to expand video wall if necessary

3.11.4.5 Communication network

a) Connectivity with main Level 4 switches
b) Passenger WiFi specifications

3.11.4.6 Overview of processes to obtain

a) Fare media supply (test and production)
b) SAM supply (test and production)
c) Certificates and secure keys, where required
d) Tools for integration (emulators, SDKs, APIs)
e) Supply of Personalization devices / point of sales
- Supply
- Training
- Maintenance

3.11.5 The Contractor shall ensure that the Red Line functions as an integral part of the Karachi BRT

3.11.6 The Employer will allow the Contractor access to the Test and Training Centre to perform testing.

3.11.7 The Employer may provide the Contractor remote access to test APIs and interfaces to support development and integration testing.

4. Project Implementation Framework

4.1 Introduction

4.1.1 The Contractor shall conduct two formal design review workshops (with each extending over multiple days as needed), which will be known as the High-Level Design Review and Detailed Design Review sessions. These reviews shall be conducted to finalize the progress and technical adequacy of the design and compatibility with the requirements of the contract.

4.1.2 The Contractor shall propose a design review schedule. The initial schedule shall be tentative and shall be updated as necessary to provide a minimum notice of six (6) weeks for each scheduled review.

4.1.3 The Contractor shall submit design review material incrementally; however, at least four (4) weeks prior to a scheduled design review, the Contractor will complete the submittal of the final High Level or Detailed Design Documentation, together with a summary of the design items to be reviewed during this High-Level Design Review or the Detailed Design Review meeting.

4.1.4 Each section of the Design Documentation shall contain version control numbers and revision dates.

4.1.5 The design review shall be conducted on mutually agreeable dates at the Employer offices.

4.1.6 The Contractor and Employer shall provide design review personnel with technical competency and knowledge in all subject areas reviewed

4.1.7 The following chart illustrates the proposed approach to the definition, implementation and later testing, from the Project inception to the Service Commencement Date:

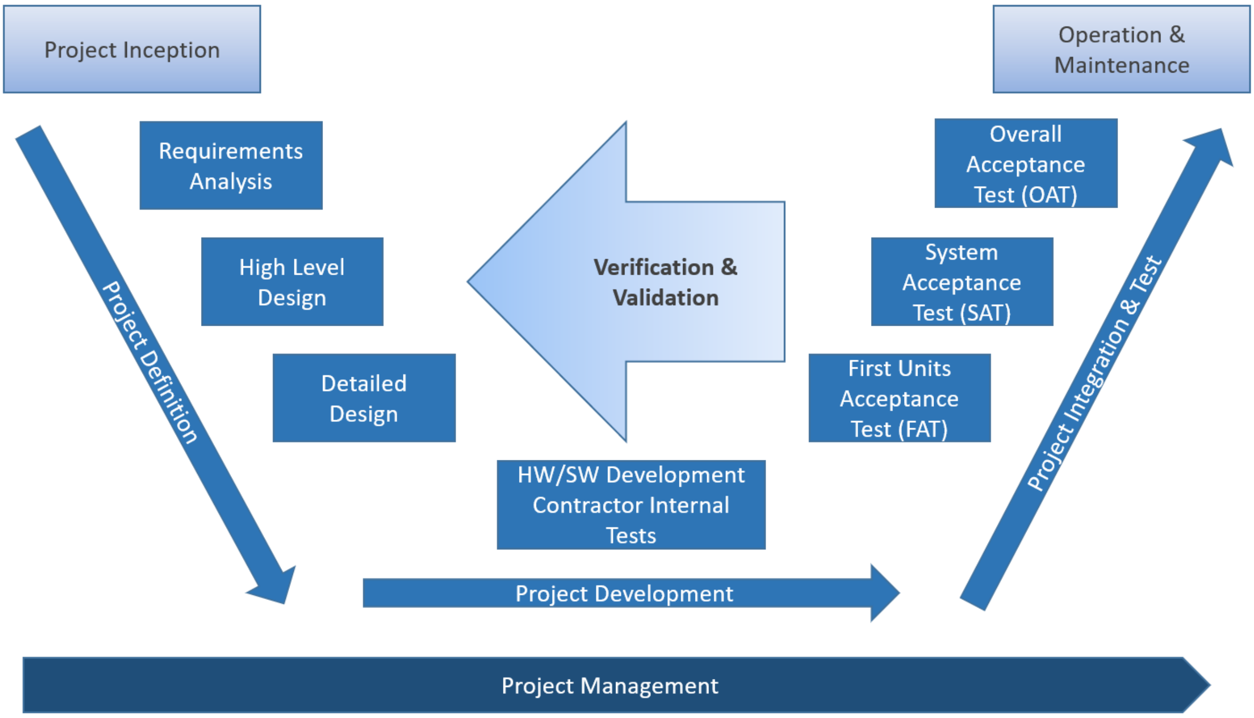

Project Inception
Operation & Maintenance
Requirements Analysis
High Level Design
Detailed Design
Verification & Validation
Overall Acceptance Test (OAT)
System Acceptance Test (SAT)
First Units Acceptance Test (FAT)
HW/SW Development Contractor Internal Tests
Project Definition
Project Integration & Test
Project Development
Project Management

Figure 9: Project Implementation Framework Summary

4.1.8 Requirements Analysis:

4.1.8.1 In this phase, the requirements of the proposed system are collected by analyzing the needs of the Contractor and the Employer’s requirements. This phase is concerned about establishing what the system has to perform. However, it does not determine how the hardware or software will be designed or built. Usually, the contractual documentation is reviewed and a Design Requirements Compliance Matrix (DCRM) is created o updated by the Contractor.

4.1.8.2 The DRCM is a table consisting of design requirements or criteria by row, and compliance information by column.

4.1.8.3 A DRCM also references inspections, tests, analyses, and acceptance criteria that are used to confirm that both design and project requirements are fulfilled.

4.1.8.4 A DRCM contains columns that are used for planning how each requirement will be met by addressing inspections, tests, and analyses as potential methodologies.

4.1.9 High Level Design:

4.1.9.1 The Contractor will analyze and understand the business of the proposed system by studying the Employer’s requirements. The Contractor will figure out possibilities and techniques by which the requirements can be implemented. If any of the requirements are not feasible, the Employer will be informed at the earliest. A resolution will be proposed by Contractor and the high level DRCM will be issued accordingly, linking requirements with the expected grade of compliance and the reference to the design documentation that covers each requirement.

4.1.9.2 The high-level design phase will focus on system architecture and design. It will provide overview of solution, platform, system, product and service/process.

4.1.10 Detailed Design

4.1.10.1 The Detailed Design specification will comprise the detailed document providing information about the products to be delivered. For example, the design specification must include all necessary drawings, dimensions, environmental factors, ergonomic factors, aesthetic factors, maintenance that will be needed, etc.

4.1.10.2 The Detailed Design will include a Detailed Operation Services Plan describing at least the following:

a) clear objectives
b) activities to be delivered
c) quality standards
d) desired outcomes

e) staffing and resource requirements

f) implementation timetables

g) a process for monitoring progress

4.1.10.3 DCRM will be updated accordingly, linking requirements with the expected grade of compliance and the reference to the Detailed Design documentation that will confirm the compliance of each requirement.

4.1.11 HW/SW Development & Contractor Internal Tests

4.1.11.1 During this phase the Contractor will develop the final functionality and produce the first unit of the corresponding equipment. All these components will be internally tested by the ITS contractor in order to be ready for the formal verification & validation process.

4.1.12 First Units Acceptance (FAT)

4.1.12.1 The objective of this test is to provide confidence that the developed ITS equipment meet both the functional and non-functional requirements.

4.1.12.2 Once design is approved and before mass production starts, during FAT all ITS components will be prepared in a controlled environment at the Contractor premises for full testing. These tests will be performed on at least one unit of each type of ITS equipment. Tests will cover all functional, hardware and environmental specifications.

4.1.12.3 The actual results are retained for comparison with the expected results. If the actual results match the expected results for each test case, the test case is said to pass. If the quantity of non-passing test cases does not breach the project's predetermined threshold, the test suite is said to fail. If it does, the system may either be rejected or accepted on conditions previously agreed between the Employer and the Contractor.

4.1.12.4 Once these tests are successful, the ITS equipment will be considered ready for the first batch production and the following testing milestone will be considered.

4.1.13 System Acceptance Test (SAT)

4.1.13.1 The SAT is to be performed with a reduced set of vehicles, stations and the corresponding equipment that will be installed and commissioned before the SAT. The test operation will be performed on-site during one (1) month.

4.1.13.2 SAT is intended to be a test and a demonstration, with a limited set of equipment, of the integrated functional and performance characteristics in real conditions during a trial operation.

4.1.13.3 Similarly to FAT, the actual results are retained for comparison with the expected results. If the actual results match the expected results, the test case is said to pass. If the quantity of non-passing test cases does not breach the project's predetermined threshold, the test suite is said to fail. If it does, the system may either be rejected leading to fixing open issues and execute one more iteration of the pending tests or accepted on conditions previously agreed between the Employer and the Contractor. The review period by the Employer will take two (2) weeks.

4.1.13.4 Once these tests are successful, ITS equipment will be considered ready for mass production and the following testing milestone will be considered.

4.1.14 Overall Acceptance Test (OAT)

4.1.14.1 Once the whole system is installed and commissioned, the Overall Acceptance Test will take place in order to validate the whole system under trial operation during two (2) weeks.

4.1.14.2 If tests are successful, and valid As-Built document is delivered, the Employer will issue OTA certificate.

4.2 Project Management and Staffing

4.2.1 The Contractor shall provide staff and key personnel as identified for the project (note this excludes personnel to deliver the services).

4.2.2 All on-site Contractor staff shall report to the Project Manager who shall have full control over all schedules, staff and on-site decisions.

4.2.3 The Contractor Project Manager shall be present at all project meetings and shall be fully responsible for the management of the project from inception to completion.

4.2.4 The Contractor Project Engineer shall be available, in person or by teleconference, for all project meetings and specialty technical meetings.

4.2.5 The Contractor’s key technical, documentation, training and other staff shall be available in person or by teleconference, as appropriate, to discuss specific items as needed.

4.2.6 Project management shall be an ongoing and continuous service provided by the Contractor to ensure that Employer requirements are met in terms of functionality, schedule and within the proposed cost

4.3 Coordination of Work

4.3.1 The Contractor shall coordinate all work done by subcontractors. Any communication between Employer and the subcontractors shall be done through the Contractor.

4.3.2 The Contractor shall coordinate all on-site work and access with Employer. All access is subject to approval by Employer.

4.3.3 The Contractor shall ensure that all points of interface have been investigated well, and all technical risks addressed. The Contractor shall ensure that operators, vehicle operators, system maintainers, and planning staff and system administration staff have been trained on the operation of the systems, as well as briefed on how the systems will change their job responsibilities and enhance their ability to perform their jobs efficiently.

4.4 Schedule and Progress Monitoring

4.4.1 The Contractor shall prepare a Master Schedule of work to be submitted four (4) weeks following signing of the Agreement.

4.4.2 The Master Schedule shall include milestone dates for all interfaces, availability and requirements that are to be delivered by or to a third party. For example, the timing for all data requirements for facility availability, power/communication availability, training etc. shall be clearly identified.

4.4.3 A separate sub-schedule illustrating activities, milestones and progress related to the ITS sub-systems implementation shall be included and maintained as part of the Master Schedule.

4.4.4 The schedule shall be updated on a monthly basis to reflect the progress attained in the previous month and the anticipated changes in the future.

4.4.5 The Contractor shall provide monthly status reports during system installation and system testing, detailing current progress, percent of project completion, any subcontractor work, and problems encountered.

4.5 Quality Assurance and Control

4.5.1 The Contractor shall provide a Quality Assurance Plan identifying their internal processes for the creation and review of deliverables including parties responsible and the respective time frames, submitted four (4) weeks following signing of the Agreement.

4.6 Project Schedule

4.6.1 The Contractor shall adhere to the following high-level implementation schedule for ITS equipment and software, including hardware and software for the stations, depots, test-bench and Operational Control Center. The schedule lists the work items and milestones for the components expected to be on the critical path. Individual elements and services may be commissioned earlier. Contractor will base its Project Plan on the schedule below.

Contractual Milestone Dates	
Contractual Milestone	**Planned Approval Date**
Requirement Analysis	4 weeks after NTP
High Level Design Approval	15 weeks after NTP
Detailed Design Approval	24 weeks after NTP
First Units Acceptance Test Approval	34 weeks after NTP
Integration tests	44 weeks after NTP (after batch production)
System Acceptance Test Approval	50 weeks after NTP
Overall Acceptance test Approval	56 weeks after NTP
System Operation and maintenance	-

Table 5: Contractual Milestone Dates

4.6.2 Within six (6) weeks from receipt of a Services Commencement Notice from Employer, Contractor shall commence the Services specified therein, which may include one or more of the ITS Services.

4.6.3 Employer and Contractor will work together to complete the system implementation process in shortest possible time and to install and commission the system in accordance with the schedule provided by the civil works implementing agencies.

4.6.4 Penalties will be applied by the Employer on the Contractor for not achieving the Planned Approval Dates.

4.6.5 For the delay in achieving the Planned Approval date for High Level Design, Detailed Design and First Units Acceptance Test a penalty of 0.143% of the payment will be applicable to for each whole or partial week of delay.

4.6.6 For the delay in achieving the Planned Approval Date for Systems Acceptance Test and Overall Acceptance Test, a penalty of 0.143% of the price of the delayed systems for each whole or partial week of delay shall be applied.

4.6.7 Penalties will be applicable to all system parts that cannot work because of the delay of the affected System part.

4.6.8 If hardware delivery is delayed, the penalty will also apply proportionally to the value of the software which cannot work properly.

4.6.9 If a software delivery is delayed, the penalty will also apply to all hardware which cannot work properly.

4.6.10 If a software delivery is delayed, the penalty will also apply to all related software which is connected to and cannot work because of the delayed software as well as the hardware of the related software.

4.6.11 The maximum penalties that can be applied under this section 4.6 should not exceed 10% of the Contract Price.

The following figure summarizes the aforementioned phases within the project implementation framework:

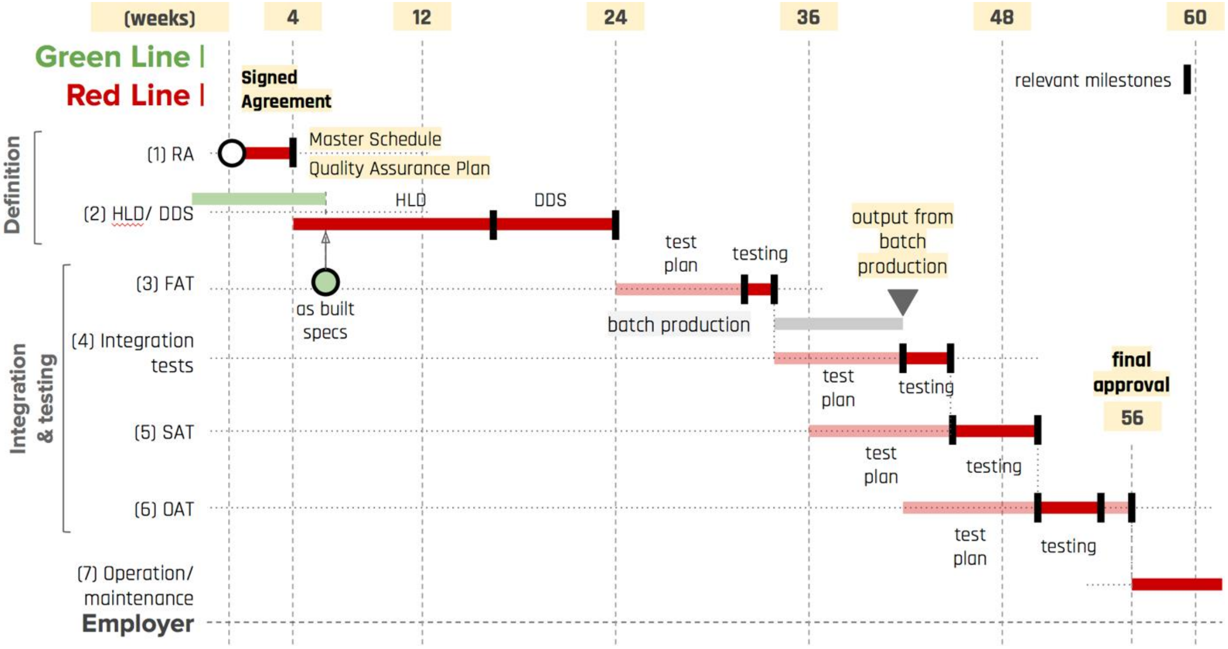


Figure 10: Project Implementation Schedule and Milestones Dates

5. Project Definition: System Design

5.1 High-Level Design

5.1.1 The High-Level Design shall represent approximately 50-70% completion of the total engineering work.

5.1.2 High-Level Design documentation will be provided in English.

5.1.3 The High-Level Design Document, issued in an electronic WORD or PDF format, shall include at a minimum:

a) Schedule compliance and discussion of variances or delays.

b) An overall system architecture identifying functional blocks, distribution of major processes, and data and information flows.

c) Design Requirements Compliance Matrix;

d) Sub-systems architecture diagrams up to the equipment package level.

e) Flowcharts, diagrams, and supporting text describing major system processes. Major software applications shall be described in detail, especially where custom processing algorithms are to be provided.

f) Functional and physical descriptions of all proposed hardware elements.

g) Preliminary user interface information and drawings, flow charts, messages and menus.

h) Description of all system security features.

i) Preliminary equipment mounting arrangements, dimensions and installation requirements.

j) Preliminary data model describing entities, attributes, data dictionary and meta data.

k) Description of the remote update solution.

l) Communications system architecture described graphically and in text, along with descriptions of the transmission mediums to be used, capacity utilization, speed, and expected reliability and availability.

m) Hardware and software interfaces with other Employer systems, including a complete description of the inter-relationships of hardware supplied by the Contractor and the vehicles.

n) System backup and recovery procedures.

o) Software design descriptions (top level of software documentation).

p) Preliminary report structure and content.

5.1.4 High-Level Design material shall also include annotated outlines of all manuals, training materials and other system and operational documentation.

5.1.5 The High-Level Design Review summary will at least consolidate the main design items to be reviewed, outstanding issues and proposed actions to resolve the outstanding design items. Such actions may include:

a) No further action required. This shall be accompanied either by a note that this was agreed to at the meeting, or by an explanation/justification by the Contractor.

b) To be revised for Detailed Design Review.

c) Outstanding issue for resolution. This shall be accompanied by a description of each issue, options for resolution, and process for resolution.

5.1.6 All issues and proposed actions/resolution are subject to approval by the Employer before a Design Document shall be issued for review.

5.2 Detailed Design

5.2.1 For the Detailed Design Review, the Contractor shall furnish the Employer with updated and complete written documentation describing the system to be delivered including all equipment and software to be furnished.

5.2.2 Detailed Design documentation will be provided in English.

5.2.3 The Detailed Design Review materials shall include in both hard copy and electronic format a draft version, at least representing 90% of the final release, of the complete Detailed ITS Design Specification, including at a minimum:

a) Schedule compliance and discussion of variances or delays.

b) Design Requirements Compliance Matrix;

c) Major assumptions and risks

d) Overall system schematic and architecture

e) Final system architecture identifying functional blocks, distribution of major processes, and data and information flows.

f) Final flowcharts, diagrams, and supporting text describing major system processes. Major software applications shall be described in detail, especially where custom processing algorithms are to be provided.

g) Detailed description of all sub-systems and equipment and hardware, including functional description, interface descriptions, communications loading details, material specifications (i.e. environmental, electrical etc.), configuration details and installation details

h) Description of how the systems deal with a loss of communication

i) Detailed remote update solution description.

j) Details on all network, data, power/electrical or other requirements provided by a third party

k) Detailed description of all software, including functional description, system interface descriptions, Graphical User Interface descriptions, hardware specifications, availability and reliability figures and configuration details

l) Detailed description of the information style and content that will be disseminated to the public, including but not limited to, passenger information displays, automatic gate and validator displays, mobile apps, and FAQs and websites to educate passengers on the functioning of the BRT and the Fare System

m) Detailed descriptions of information, materials, and timing required by the Contractor of other parties.

n) Listing of all third-party software to be provided including version number and license information.

o) Detailed hardware functional and physical descriptions including dimensions, weight, power and environmental requirements.

p) Detailed user interface information and drawings, flow charts, messages and menus.

q) Updated description of all system security features.

r) Final equipment mounting arrangements, dimensions and installation requirements including all brackets and mounting hardware design. Design work related to this will require input and review from, and coordination with, Employer and/or vehicle manufacturers. The Contractor shall provide final estimates of installation time and shall prepare detailed installation procedures.

s) Final data model describing entities, attributes, data dictionary and meta data.

t) Final communications system architecture described graphically and in text, along with descriptions of the transmission mediums to be used, capacity utilization, speed, and expected reliability and availability.

u) Final hardware and software interfaces between and within ITS and with third parties. Each interface shall be described in a unique interface control document describing all associated electrical, data and security elements and structure of the interface.

v) Final system backup and disaster recovery procedures, including final Data Backup Plan and Business Continuity Plan

w) Final report structure, content and format.

5.2.4 Detailed Design Review material shall also include draft versions of all manuals, training materials and other system and operational documentation. Final versions shall be submitted as part of "as-built" documentation.

5.2.5 Detail Design materials will be updated after implementation and delivered to the Employer, representing the final release of the design materials that will specify the actual implementation of the finished and deployed deliverables.

5.2.6 The Detailed Design Review shall determine that the detail design of the subsystem under review will satisfy the design requirements and establish the exact interface relationships between the subsystem and equipment or facilities.

5.2.7 The Detailed Design Review summary will at least consolidate the main design items to be reviewed, outstanding issues and proposed actions to resolve the outstanding design items. Such actions may include:

a) No further action required. This shall be accompanied either by a note that this was agreed to at the meeting, or by an explanation/justification by the Contractor.

b) To be revised for Detailed Design delivery.

c) Outstanding issue for resolution. This shall be accompanied by a description of each issue, options for resolution, and process for resolution.

5.2.8 All issues and proposed actions/resolution are subject to approval by Employer.

The following figure summarizes the aforementioned phases within the project definition framework

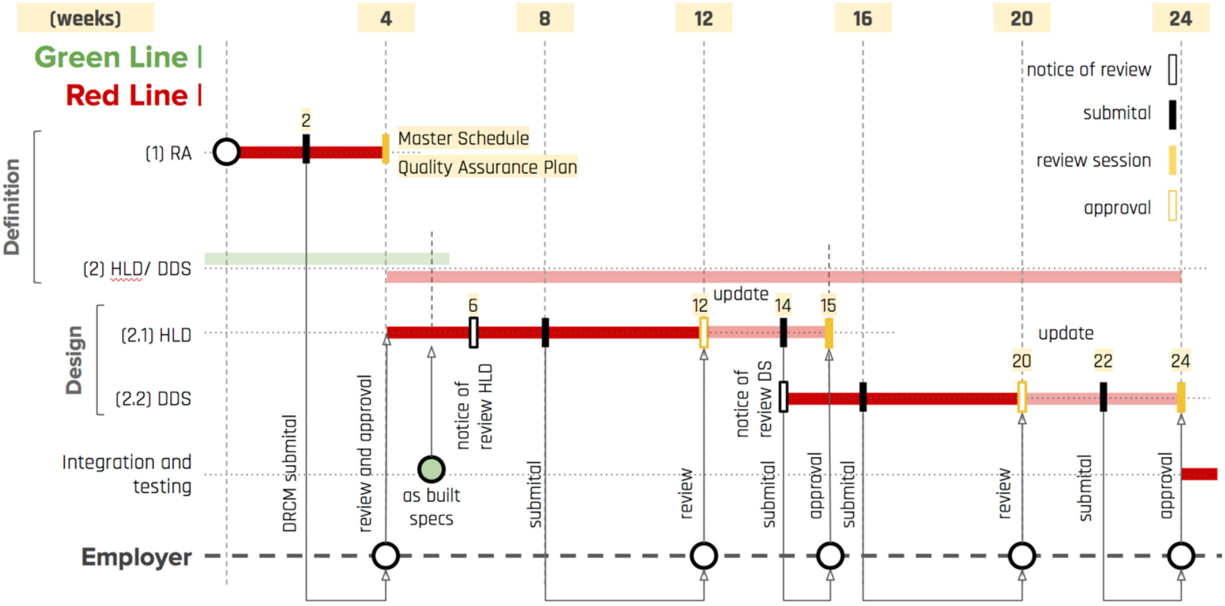


Figure 11: Project Definition Schedule and Milestones Dates

6. Project Integration and Testing

6.1 Introduction

6.1.1 The Contractor will be responsible for conducting all testing as described herein. Work under this section shall include all labor, materials, and support services required to completely test all hardware and software.

6.1.2 If a type of equipment does not meet the specifications or requirements as stated in this Schedule of Requirements or the Detailed Design Document, it shall be the Contractor's responsibility to correct the problem in all units of that equipment furnished, at no additional cost to Employer.

6.1.3 All of the components, subsystems, interfaces and systems processes constituting the ITS subsystems shall be tested individually and together to demonstrate that they meet the contract requirements and provide a system that functions in accordance with the Agreement. The Contractor shall be responsible for the full integration of all components of the system.

6.1.4 During preparation of the detailed design specification and testing, the Contractor shall highlight any features available in the hardware and software packages which may enhance the functionality and ease of operation of the system.

6.1.5 The system and software shall be developed and configured based on the approved Detailed Design. The Contractor shall carry out his own testing of the system in such a way as to guarantee the equipment to meet the claimed functionality, performance and compliance. These tests shall simulate normal operating conditions for the components being tested. The Contractor shall supply to Employer a certificate that each item of equipment has been tested and is in correct working order and complies with the requirements and detail design specifications.

6.1.6 The Contractor shall be responsible for the performance of all of the tests described below to satisfy the objectives of each testing phase as determined by Employer.

6.1.7 The Employer shall have the right to witness any and all tests. Nevertheless, should the presence of the Employer or any Employer's representative (such as consultants) be necessary, travel and lodging costs will be borne by the Contractor.

6.1.8 Test plans for each test stage shall be submitted to Employer a minimum four (4) weeks prior to the planned start of testing. Testing shall not commence until the plans have been approved, provided that Employer delivers its comments, if any, on the test plans not later than two (2) weeks prior to the planned start of testing and those comments have been incorporated in the test plans.

6.1.9 Unless otherwise specified, all test plans shall include at a minimum the following:

a) Overview of test including test objectives
b) Pass/fail criteria
c) Traceability matrix listing of all requirements and specifications from the Contract that are included/to be verified in the test and their cross-reference to the Specifications and System Design Document.
d) Test setup and test measuring equipment (including descriptive diagrams)
e) Listing of tools, test applications, simulators, etc. required to perform the test
f) Entry/start-up conditions
g) Exit/closing conditions
h) Test procedures and scripts to be executed
i) Test recording form
j) Test comments form
k) Signatures and verification form

6.1.10 The Employer reserves the right to direct, at no additional cost, the following changes to the test plans:

a) The addition of procedural changes and other reasonable tests to reasonably assure System performance and conformance
b) Investigation into any apparent troubles or anomalies with respect to the System
c) An audit of all test reports and verification of any or all previous tests and measurements.

6.1.11 The Contractor shall provide for each required test stage, at least two (2) weeks before of the formal testing, written notification of testing readiness.

6.1.12 Upon completion of any test milestone, the Contractor shall prepare and submit within two (2) weeks a report summarizing the results with relevant test records appended. All such test reports will be reviewed by Employer. Only upon acceptance by the Employer shall the test stage be deemed completed.

6.2 Test Suspension Criteria and Defect Resolution

6.2.1 All test failures, system errors, or missing functionality shall be recorded as Defects by the Contractor and assigned a “Defect Severity” rating as follows:

a) Severity 1: Required functionality is substantially not available; normal in-service operation of the device or subsystem cannot be maintained; or Employer operations are disrupted; or loss of revenue is established or expected.

b) Severity 2: Functionality is substantially available, but one or more sub-functions are not operating as specified; full functionality is available but performance is not within specifications; normal in-service operation can be maintained via a workaround.

c) Severity 3: Minor software defect or usability problem for which there is a workaround.

6.2.2 The Contractor shall maintain a database of Defects found during the corresponding testing and shall track the status of these Defects. This database shall be integrated with the KPI monitoring systems.

6.2.3 The Employer reserves the right to re-classify a defect severity based on the impact to system operation or transport operations.

6.2.4 All Severity 1 and 2 defects shall be corrected prior to completion of the stage of testing where they were identified. Test results for that stage shall not be accepted until such time as the Contractor demonstrates that all Severity 1 and 2 defects have been resolved and tested.

6.2.5 Severity 3 defects may be carried forward into software or system modifications in the next stage of the project and shall be demonstrated to be corrected in the next planned testing stage.

6.2.6 The Contractor shall develop and maintain a standard set of regression tests for each device or subsystem. Regression tests shall be run for any affected device or subsystem in the event that any testing is halted and restarted in accordance with the requirements of Severity 1 defect resolution.

6.3 Testing Stage 1: First Units Acceptance Test (FAT)

6.3.1 A FAT will be conducted at the Contractor premises to demonstrate the agreed conformance, functionality and performance of that component/components of the system.

6.3.2 The Contractor shall be responsible for the provision of any test beds or bench test facilities, including any power supplies, simulators, or other components and software required to conduct the test.

6.3.3 The Contractor shall develop a comprehensive FAT program consisting, at a minimum, of the following individual test programs:

a. Hardware test to check the operating parameters of all equipment per the Specifications of this Agreement, OEM specifications, and Detailed Design Documentation.

b. Functional test to demonstrate that all functional and operational requirements and specifications applicable to the device/subsystem have been delivered.

c. Environmental, electrical and electromagnetic tests demonstrating compliance with the Agreement and regulating agency requirements.

d. Human factors test for all devices/subsystems with a user interface.

6.3.4 All equipment types shall be tested. A minimum of one (1) unit of each equipment type, identically configured to the mass production units, shall be subject to the First Unit Acceptance Test unless waived by Employer without prejudice.

6.3.5 The Contractor will be responsible for ensuring all necessary coordination with the BRT Vehicle manufacturer to guarantee a successful BRT Vehicle First Units Test is accomplished.

6.3.6 After sharing with the BRT Vehicles Manufacturer all power requirements, design plans, installation plans and instructions, fabrication plans, wiring diagrams, connection instructions, and bills of materials, the Contractor will be responsible for the BRT First Unit vehicles preparation, ITS on-board equipment supply, installation, integration, commissioning and BRT First Unit vehicles testing of all the on-board ITS components in the aforementioned BRT First Unit vehicles.

6.3.7 Any device certifications required by regulatory agencies shall be the responsibility of the Contractor. Required certifications shall be submitted with each shipment of devices or subsystems.

6.3.8 Any changes to the hardware configuration after the FAT execution shall require a retest of the First Unit Acceptance Test.

6.4 Testing Stage 2: System Acceptance Test (SAT)

6.4.1 A System Integration Test shall be conducted to verify that subsystem components, when integrated together in their final location on-site, meet the system level functional requirements and specifications. The System Integration Test shall be completed prior to onsite installation of the system.

6.4.2 The Contractor shall be responsible for the provision of any necessary test beds or bench test facilities, including power supplies, simulators, or other components and software required to conduct the test.

6.4.3 The System Integration Test shall include the provision of all types of equipment and interfaces supplied by the Contractor in at least two (2) BRT vehicles, two (2) stations, one (1) BRT vehicle Depot and the OCC.

6.4.4 The Contractor shall develop a comprehensive SAT program consisting, at a minimum, of the following individual test programs:

a. System configuration

b. Integrated operation of all devices and subsystems

c. End-to-end connectivity and correct processing/handling of data, application software updates and messages

d. Scenario or use-case testing to demonstrate that all system-level functional and operational requirements and specifications have been delivered

e. As applicable, environmental, electrical and electromagnetic tests demonstrating compliance with Agreement and regulating agency requirement in the integrated form of the system.

6.4.5 The System Integration Test shall include time and provisions for the Employer staff to conduct independent system integration testing using their own or ad-hoc script and test cases. The Contractor shall provide support during these tests.

6.5 Testing Stage 3: Overall Acceptance Test (OAT)

6.5.1 The Overall Acceptance Tests are the final tests to be fulfilled and can only be initiated once all the ITS elements have been installed and configured, after previous test milestones have been successfully completed.

6.5.2 The Contractor shall develop the OAT Plan, which shall be submitted to the Employer for review and acceptance at least six (6) weeks prior to commencement of OAT.

6.5.3 The Overall Acceptance Tests will focus on the main overall ITS functional requirements compliance demonstration, the ITS equipment commissioning, site acceptance testing, and operational handover.

6.5.4 The Contractor shall prepare comprehensive test and acceptance schedules. These schedules shall be completed and signed by the Contractor during his own testing, and then presented to the Employer for signature, where all items shall be demonstrated to the Employer for acceptance.

6.5.5 Acceptance testing shall be performed on all ITS equipment and services placed into service to demonstrate the expected performance. The Employer shall be informed of any individual acceptance testing at least one (1) week in advance.

6.5.6 The OAT shall be conducted over a minimum four (4) weeks period. During the system acceptance testing period, the Contractor shall measure and report system and subsystem performance, defects and failures, and report the same on a weekly basis. The OAT Test Report shall be submitted to the Employer, for approval within two weeks after submission.

6.5.7 Services Commencement may initiate for one or more services prior to completion of the OAT.

6.5.8 OAT Completion will be granted when:

a) All system acceptance testing requirements as per the OAT Plan have been met.
b) All as-built and final documentation has been delivered and accepted
c) All Fare System cryptographic key material has been turned over to Employer
d) All source codes of custom-built components have been placed in escrow

The following figure summarizes the aforementioned phases within the project definition framework:

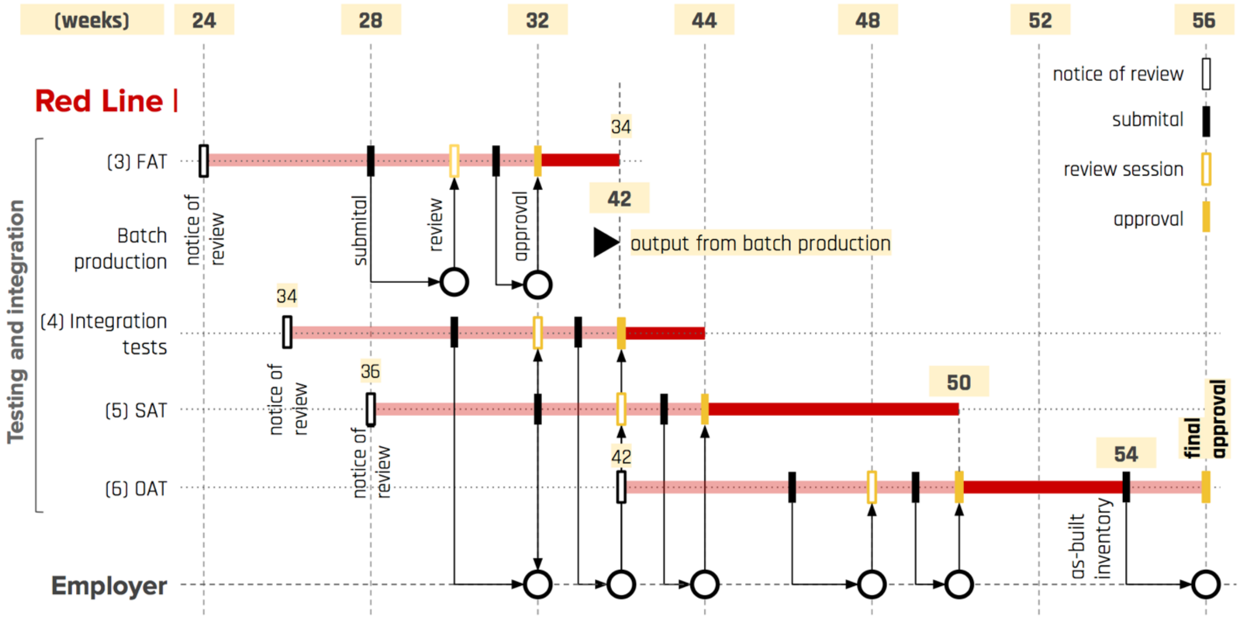


Figure 12: Project Definition Schedule and Milestones Dates

7. Submittals

7.1.1 The Contractor shall configure an on-line secure project digital repository. The Contractor shall provide access to at least fifteen (15) personnel of Employer and its contractors. All submittals described in this specification shall be in threefold where possible: two hardcopies unless specified otherwise, a digital version in the online repository (one version in an editable format where possible, one version in the PDF format), and a digital physical version (one version in an editable format where possible and one version in the PDF format). All submittals shall be provided in standard English.

7.1.2 The Employer shall have the right to reproduce all submittals as required for internal and consultant distribution and system operation. All submittals, documentation, designs shall appear on the repository and remain on the repository for the duration of the project phase twenty-six (26) weeks after OAT Completion.

7.1.3 During the operational phase of the term, the Contractor shall continue to provide access to all final, living and updated documents which may be stored on a server in the Operations Control Center.

7.2 System Design documentation

7.2.1 System Design documentation shall be submitted as described in Section 5.

7.2.2 For custom-manufactured equipment, the Contractor shall submit a set of comprehensive shop drawings and specifications as part of the material selection documentation. The comprehensive shop drawings shall include the general arrangement, layout, wiring details, mounting bolt requirements, location for conduit entry and any physical or electrical requirements.

7.2.3 For standard off-the-shelf items, the Contractor shall submit detailed manufacturer product specifications, drawings on mounting requirement, location of conduit entry and any other physical or electrical requirements.

7.2.4 The Contractor shall provide certification and compliance statements for all standards that apply to the manufacturing of the equipment, whether custom manufactured or off-the-shelf.

7.3 Installation and User Manuals

7.3.1 The Contractor shall provide six (6) installation and user manuals, both in electronic and hard (printed) copy, for each type of unit provided. All manuals must be provided in English.

7.3.2 The manuals shall provide sufficient detailed installation and maintenance instructions to allow the Contractor or its successor to properly and safely install, connect and commission the equipment supplied.

7.4 Training Manuals

7.4.1 Training manuals shall be provided for each training participant in both digital (PDF) format and as a hard(printed) copy. In addition, six (6) additional hard copies shall be provided. All manuals will be provided in English.

7.4.2 The manuals shall provide information on all of the topics covered during each of the training sessions and include exercises and screen captures. The Training Manual shall include space for the users to take notes during the training sessions. The Training Manuals shall be provided at the initiation of each training session.

7.5 Test Documentation

7.5.1 Testing documentation shall be submitted as described in Section 6.

7.6 As-Built Documentation

7.6.1 The Contractor shall provide sufficient documentation to reflect "as supplied" conditions and to facilitate operation, maintenance, modification and expansion of the equipment or any of its individual components to the satisfaction of Employer.

7.6.2 The System Design Documentation shall be updated to include the as-built conditions and continue to be updated as a result of maintenance/replacement activities.

7.6.3 The as-built documentation shall be provided three (3) weeks prior to OAT Completion, and updated documentation will be required at any time the Contractor provides software or hardware upgrades.

7.7 Operation and Maintenance Documentation

7.7.1 The operation and maintenance documentation shall be comprised of the Operation and Maintenance (O&M) manuals, User Manuals and System Administration Manuals. All manuals will be provided in English.

7.7.2 The operation documentation shall be developed interactively with Employer staff, and the Contractor should expect multiple iterations.

7.7.3 As part of the High-Level Design Review, the Contractor shall provide example operation and maintenance documentation from other, similar projects, indicating elements that are or are not applicable to Employer, and indicating areas of the operation and maintenance documentation that require creation or substantial revision to reflect the Employer requirements.

7.7.4 At the High-Level Design Review, the Contractor shall conduct interactive workshops using demonstration equipment to “walk through” operation using the information provided. The Contractor shall also further develop operation and maintenance documentation to meet the Employer needs for operations, training and maintenance.

7.7.5 At the Detailed Design Review, updated operation and maintenance documentation shall be provided, and further workshops conducted to revise and update the documents.

7.7.6 Final operation and maintenance documentation shall be submitted to Employer no later than two (2) weeks prior to Services Commencement.

7.7.7 The Contractor shall deliver fifteen (15) complete sets of operation and maintenance documentation excluding those in the digital repository.

7.8 Operation and Maintenance Manuals

7.8.1 The Operations and Maintenance manuals shall provide detailed descriptions and guidance, and the manuals shall include user-friendly illustrations where applicable. For each manual, the documentation shall include, but shall not be limited to:

a. General description
b. Functional descriptions
c. Functional block diagram
d. Operating instructions
e. Maintenance and repair procedures
f. Test procedures
g. Schematic drawings and circuit diagrams
h. Parts list.

7.8.2 Each type of maintenance manual shall contain but not be limited to:

a. Description of operation including start-up, shut-down and emergency procedures
b. Installation procedures
c. Complete parts identification diagram and list
d. Troubleshooting procedures
e. Inspection procedures
f. Preventive maintenance procedures and program
g. Repair procedures
h. Diagnostic procedures including criteria for equipment swap-out
i. Wiring diagrams
j. Electrical schematics with board and cable identification
k. Adjustment procedures
l. Seasonal maintenance requirements
m. Equipment arrangement and drawings
n. Names and schedules of all lubricants and cleaners to be used
o. Other consumable materials for the equipment stating where used, quantity, service intervals and annual consumption.

7.8.3 The Contractor shall provide a subassembly list for each piece of equipment supplied. The subassembly list shall identify the manufacturer(s), model/part number, address, and contact information.

7.8.4 The Contractor may use manufacturer's data and handbooks for individual items of the equipment that are a sub-component of the overall system. All such documentation shall be contained in similar binders.

7.8.5 Where an equipment component is of such a nature that local repairs cannot be made and it must be returned to the factory as a unit for overhaul, specific information concerning its repair and breakdown into component parts shall be provided as a submittal.

7.9 User Manuals

7.9.1 A User Manual shall be provided for each software application. The User Manual shall include screen captures and easy to follow instructions to assist the users through all of the tasks that they may need to complete. The User Manual shall include an index.

7.9.2 As a minimum, the User Manual shall include all information that is available through the context-sensitive help system.

7.9.3 Fault procedures shall be described and submitted, as well as procedures for dealing with problems.

7.10 System Administration Manual

7.10.1 System Administration Manuals shall be provided for each software application. The System Administration Manual shall outline all of the configuration parameters, details on how to configure the parameters, back-up and recovery process, troubleshooting techniques and technical support information.

7.10.2 Fault procedures shall be described, as well as procedures for dealing with problems.

7.11 Submittals Review and Acceptance

7.11.1 All submittals shall be complete when issued. Incomplete or substantially under-developed submittals will be rejected and shall not be considered as either a draft or final document.

7.11.2 The Contractor shall include three (3) weeks in their schedule for Employer review of each documentation submission, and shall include the necessary time and resources to modify the documentation to incorporate comments from Employer.

7.11.3 All pages of the documentation shall carry a title, version number and issue date, and all documents shall contain a complete subject index. The Contractor shall be responsible for fully coordinating and cross referencing all interfaces and areas associated with interconnecting equipment and systems.

7.11.4 Documentation shall require re-issues if any change or modification is made to the equipment or functions supplied. Through the course of the contract, the Contractor may re-issue individual sheets or portions of the documentation that are affected by the change or modification. Each re-issue or revision shall carry the same title as the original, with a change in version number and issue date.

7.11.5 Equipment installation drawings shall be prepared using AutoCAD and Adobe Acrobat.

7.11.6 As-built drawings shall be supplied to show engineering changes made to any component or module up to the end of the warranty period of the system supplied.

7.11.7 Each hard copy volume shall have a binder (stiff cover and spine), and drawings shall be protected by clear plastic to withstand frequent handling. The binding arrangement shall permit the manual to be laid flat when opened.

8. Installation

8.1 Implementation Requirements

8.1.1 Unless otherwise specified, the Contractor shall provide all materials, parts, interconnect cables and connectors, software, documentation, installation instructions, and commissioning instructions for the ITS equipment. This includes mounting brackets, stanchion extensions, hardware, cable labels, grommets, cable clamps and harnesses, and other materials required to install the equipment.

8.1.2 The Contractor is responsible for the initial configuration of the ITS, including but not limited to:

a. Operationalization of KPIs to configure the KPI Monitoring system

b. Measurement of stop-to-stop / station-to-station / station-to-stop distance and route kilometre which shall be the basis for payment to Vehicle Operating Companies

c. Collection of exact coordinates on on-corridor station and off-corridor stops; record bus stops name and other necessary recording for automated announcements on these routes.

8.2 On-Board Equipment Installation

8.2.1 The Contractor will be responsible for preparing all power requirements, design plans, installation plans and instructions, fabrication plans, wiring diagrams, connection instructions, bills of materials, and commissioning and testing instructions associated to all ITS equipment to be installed in BRT vehicles and individual configurations. Such information shall be provided at or before the High-Level Design Review submission and will be provided to the BRT vehicle supplier to assist with their design, manufacture and configuration of the BRT vehicles.

8.2.2 The Contractor shall be responsible for vehicle preparation and the installation, integration commissioning and testing of all on-board ITS components in BRT vehicles.

8.2.3 The Contractor shall provide installation information as noted above, shall provide and install all equipment at the location designated by the employer (the BRT vehicle manufacturer or a designated depot site) and shall be responsible for providing coordination and oversight required to certify that all equipment has been installed and tested correctly.

8.2.4 In order to guarantee the optimal integration between the BRT Vehicle and the ITS equipment, or in the event that the BRT vehicle manufacturer wishes to use their own forces to install the ITS on-board equipment, the Contractor shall provide in a timely manner all equipment, wiring, tools, hardware, mountings, design documentation, instructions, and training required, and shall remain responsible for certifying the installation.

8.2.5 With each vehicle installation, and immediately upon completion of the installation work, the Contractor shall test and demonstrate that the onboard system is fully functional.

8.2.6 Equipment shall allow for easy installation/removal in vehicles through the doors without requiring door disassembly.

8.2.7 In-vehicle system devices shall be identical in installation characteristics across each BRT vehicle type and model.

8.2.8 Equipment shall not pose a hazard to operators or passengers when operated in accordance with manufacturers’ recommendations.

8.2.9 Cables provided by the Contractor shall be fully labelled at both ends.

8.3 BRT Stationary Equipment Installation

8.3.1 It shall be the responsibility of the Contractor to develop all necessary installation requirements for stationary equipment including ITS equipment, power supplies (from distribution boards), conduits (from data cabin), enclosures, etc.

8.3.2 The Contractor shall be responsible for the installation, local configuration, network configuration, commissioning and testing of all stationary equipment, including locations such as BRT stations and Depots.

8.3.3 The Contractor shall coordinate the installation of all stationary equipment with the Employer.

8.3.4 The Contractor, as part of the design phase, shall prepare station design drawings, elevations and wiring connection diagrams illustrating the installation of all roadside components and their interconnection.

8.3.5 The Employer will be responsible for the continuing provision of power at all the stations and stops in operations. Power will be available in the Operational Control Center, the depots, and the stations in operation stage.

8.3.6 The Contractor shall be responsible for providing all wireless and fiber optic communications and connections.

8.3.7 All Station components shall be designed and installed to resist expected vandalism.

8.3.8 Equipment installed shall not pose a hazard to passengers when operated in accordance with manufacturers' recommendations.

8.4 Operation Command & Control Centre (OCC) Installation

8.4.1 The Contractor shall be responsible for the installation, local configuration, network configuration, commissioning and testing of all central computer systems in the Operational Control Center.

8.4.2 The Contractor, as part of the design phase, shall propose the preferred locations for the installation of all central computer system equipment.

8.4.3 The Contractor, as part of the design phase, shall prepare design drawings, elevations and wiring connection diagrams illustrating the location of all central computer system and related components and their interconnection.

8.4.4 The Employer will provide power and a network demarcation point at all central computer system sites. The Contractor shall be responsible for any local cabling requirements to connect to the demarcation points.

8.4.5 All servers and associated racks and other hardware shall be installed at a designated location in the Operational Control Center.

8.4.6 The Employer will provide access during normal operations hours for installation work that does not disrupt normal operations. All installation and cutover work that disrupts normal operation shall be conducted at night, weekends or other off-hours upon Employer's approval.

9. Training

9.1 Training Requirements

9.1.1 Mandatory training comprises training of personnel from the Contractor, the Vehicle Operating Companies, and Employer. This section specifies the minimum training requirements for Contractor personnel interfacing with passengers and training by the Contractor to the Vehicle Operating Companies and the Employer. Other training to Contractor personnel may be required such as to operate the Fare system and functions in the Operational Control Center.

Table 6: Summary of Trainings

Company	Training Function	Audience
Contractor	Sales	Personnel operating fare office, fare vending machine, supervisors
	Cash management	Supervisors and personnel operating ticket office and fare vending machines
	Security staff	Conductors, security personnel
	Inspection, sales, validation	Conductors
	Flow management	Security personnel, flow management personnel
	Customer care	Sales, flow management personnel, conductors
	First Aid	Security personnel, flow management personnel
Vehicle Operating Companies	Fleet Management & Control	Drivers and company dispatch personnel
	First line maintenance	Drivers and maintenance personnel

Company	Training Function	Audience
Employer	KPI Monitoring	Personnel nominated by Employer
	Financial reconciliation	Personnel nominated by Employer

Table 7: Training Topics

Training Function	Training objectives	Training content
Sales	Be proficient in all the functions on a station related to sales and service	Perform card sales, stored value sales, card services, fare vending machine management
Security staff	Detect and prevent thefts, vandalism, terrorism	▪ React and take appropriate measures in emergency situations ▪ Operate handheld/stationary metal detector ▪ Perform pad-downs ▪ Respond to bomb threats and suspicious packages ▪ Resolve conflict resolution ▪ Remove / resolve obstacles along the cycle way network
Inspection, sales, validation	Be proficient in all the functions on a bus or stop related to inspection, sales, validation	Operate the handheld device First line maintenance of handheld device
Flow management		
Customer care	Deal with the public in a professional and ethical manner	General working of BRT Working of fare collection system Customer service techniques Dealing with problematic incidents
Fleet Management and Control	Drive in accordance with instructions and objectives set in the Operations Control Center	Operate the supplied Fleet Management System, with especial attention to the AVL system and operation of the communications and instructions to drivers.
First line maintenance	Personnel can perform basic diagnostics and troubleshooting of relevant Automated Fare Collection System equipment and ITS equipment	
KPI Monitoring	Employer understands and can operate the KPI Monitoring systems	

Training Function	Training objectives	Training content
Financial reconciliation	Employer understands the clearing and settlement process, including limitations thereof	
First aid	Save lives, minimize injuries and hasten healing	Red Cross or Red Crescent compliant training and certificate

9.2 Test and Training Centre

9.2.1 A Test and Training Centre, provided by the Employer, will be available as part of the OCC infrastructure.

9.2.2 Hardware and Software for testing of the ITS equipment and system components is included in the Contractor's scope of delivery, including at least:

a. All necessary software and hardware to recreate the ITS L3 Management environment, including workstations, network and servers, as necessary.

b. ITS Test Bench, including at least two (2) units of each type of stationary and on-board equipment, interfaces and necessary simulators.

c. A work bench with sufficient space, power distribution, etc. to troubleshoot and dismantle malfunctioning equipment removed from a bus.

d. Wireless LAN access point to be used for testing purposes.

9.2.3 The Test and Training Centre will make possible testing new software releases and functionalities before deployment to the Production System.

9.2.4 Once new software and functionalities are tested in the Test and Training Centre, it will be possible to transfer the new releases to the production environment (in operation).

9.2.5 It must be possible to operate the components of the ITS Test and Training Centre in the production system.

10. Attachments

10.1 Draft Software License Agreement Requirements

Guide to completing the Agreement Matrix

Table 8: Agreement Matrix

Instructions	Explanation
1. Accepted: Yes_______ No________ Proposed Change: Reason for Proposed Change:	By indicating "Yes" the Bidder agrees to inclusion of this clause in the subsequent Contract. By indicating "No" Bidder does not agree to incorporating this clause. By indicating "Yes/Proposed Change" Bidder agrees to incorporate the clause with the noted text revision. Bidder must also give reason for requesting revision to text.
2. Mandatory: Confirm Acceptance Yes____________ No____________ Proposed Change: Reason for Proposed Change:	If a clause is identified as "Mandatory" it MUST be included in the Contract and its intended purpose is to be maintained. Refusing to accept a "Mandatory" clause may result in Bidder's disqualification. Bidder may check "Yes" to accept a Mandatory clause, and also propose a change to that clause, however, the Employer is not obligated to accept the proposed change and the Bidder is obligated to proceed with the accepted Mandatory clause. Bidder must also give reason for requesting revision for text.
3. Non-Negotiable Confirm Acceptance Yes____________ No____________	This indicates that the clause must be accepted "AS-IS". No revision to text will be considered. A Bidder's refusal to accept a "Non-Negotiable" clause "AS-IS" may result in Bidder's disqualification.

NOTE: Bidder's failure to accept the Mandatory clauses and/or Non-Negotiable clauses, and to request clauses otherwise not indicated in its original submission during the contract finalization process may result in disqualification.

INSTRUCTION: The Bidder must provide their proposed license agreement in hardcopy and in an electronic Word file with their submission for review and approval by the Employer. Should the offered license agreement be acceptable to the Employer, it is the intention of the Employer to use the offered license.

The provisions offered below are areas that must be addressed in the offered license. As noted above, if the areas are addressed in the offered contract, it is the desire of the Employer to use the license agreement offered. If the area is not covered by the offered license agreement, the Employer must have the offered license amended to address the topic.

Unless specifically noted, the language below is mandatory, but if deemed necessary, Bidder may present proposed wording changes for Employer consideration.

Table 9: Bidder's Response

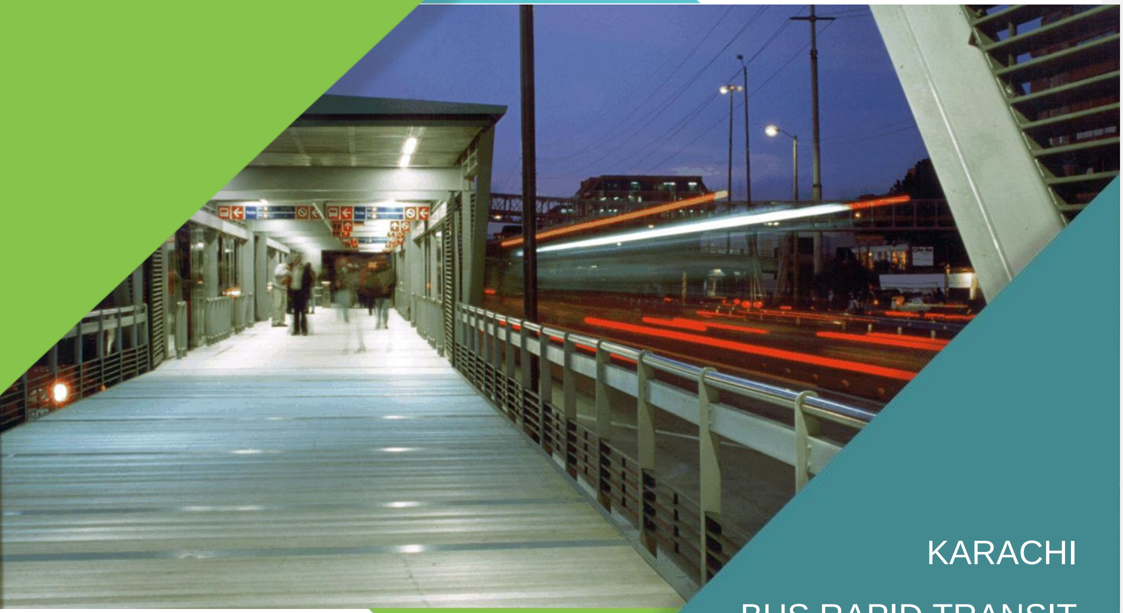
Item	Description	Bidder's Response
1.	**ASSIGNMENT** Employer shall seek approval prior to assigning contractual obligations and rights. In some cases, Employer may not be able to consent to assignment. e.g. Violation of Employer debarment policy or if Assignee is identified on any terrorist sanctions list, the United States Executive Order 13224 sanctions list and the United Kingdom terrorist sanctions list. In such cases Employer shall seek to retain license rights to and use of any perpetual software license.	**Mandatory** Confirm Acceptance: Yes___/No___. Proposed Changes: Reason for Proposed Change:
2.	**CHANGES AND MODIFICATIONS** Any contract should allow for both parties to agree to modify the contract	**Mandatory** Confirm Acceptance: Yes___/No___. Proposed Changes: Reason for Proposed Change:
3.	**CONFIDENTIALITY** Contractor must provide Employer with Confidentiality coverage to the same degree as requested by Contractor.	**Mandatory** Confirm Acceptance: Yes___/No___. Proposed Changes: Reason for Proposed Change:
4.	**CONSEQUENTIAL DAMAGES** Employer will not be responsible to Contractor for consequential damages. If in the normal use of the product, Employer information is shared with the Contractor additional language will be needed.	**Mandatory** Confirm Acceptance: Yes___/No___. Proposed Changes: Reason for Proposed Change:
5.	**DISASTER RECOVERY** For disaster recovery purposes, Employer may make one copy of the Software and use such copy on a Central Processing Unit (CPU) or server other than the designated one or at an installation site other than that for which the Software is licensed, such other installation site to be owned or controlled by the Employer or the Employer's disaster	**Mandatory** Confirm Acceptance: Yes___/No___.

Item	Description	Bidder's Response
	recovery vendor. Such copy shall be used only for the Employer's procedures and effectiveness subsequent to the occurrence of an actual disaster during which the Employer cannot operate the Software on the designated equipment or at the installation site for which the Software is licensed.	Proposed Changes: Reason for Proposed Change:
6.	**GRANT OF LICENSE** Contractor shall be specific on the type of license offered. Employer may seek the right to develop derivative works for internal use only. Nothing in the License shall preclude EMPLOYER from developing training materials and other items for use by the Employer in its usual operations.	**Mandatory** Confirm Acceptance: Yes___/No___. Proposed Changes: Reason for Proposed Change:
7.	**TERM OF LICENSE** As specified in RFP.	**Mandatory** Confirm Acceptance: Yes___/No___. Proposed Changes: Reason for Proposed Change:
8.	**INDEMNIFICATION** Contractor agrees to indemnify and hold harmless Employer, its officers, employees and agents against all claims, suits and losses, including reasonable attorneys' fees, for any claim or action brought against Employer based on a claim that the use of the Licensed Software in accordance with this Contract infringes any patent, trademark, copyright or any intellectual property rights of a third party in the country where it was sold, provided that Employer: (i) notifies Contractor promptly in writing of any claim; (ii) cooperates with Contractor to defend or settle the claim; and (iii) permits Contractor to control the defence, compromise, or settlement of the claim. If the Licensed Software or any portion thereof infringes the rights of a third party, Contractor will either: (a) procure at no cost to Employer the right to continue to use the Licensed Software in accordance with this Contract; (b) replace or modify the Licensed Software to avoid the infringement on an exchange basis provided that the replacement or modified License Software may be used in substantially the same manner by Employer; or (c) terminate this Contract and refund the license fees paid by Employer for the use of the Licensed Software based on straight line depreciation over a five (5) year period and pay Employer liquidated damages of $25,000. (can alter $ amount based on requirement value)	**Mandatory** Confirm Acceptance: Yes___/No___. Proposed Changes: Reason for Proposed Change::

Item	Description	Bidder's Response
9.	**EMPLOYER NAME/LOGO** Contractor may use Employer's name only (not its logo or any discussion of the work performed under this Contract) in its customer lists without prior approval of Employer. Any other use of the Employer's name and/or logo must be approved by written permission from *[position title]*	**Mandatory** Confirm Acceptance: Yes___/No___. Proposed Changes: Reason for Proposed Change:
10.	**PRESERVATION OF IMMUNITIES AND DISPUTE RESOLUTION** **NOTE: THIS LANGUAGE MUST BE INSERTED UNCHANGED** Notwithstanding any other provision of this Contract, it is understood that neither this Contract nor the arbitration of a dispute arising under or in connection with this Contract shall constitute or be considered to be a limitation upon or a waiver of the privileges and immunities of the members of ADB including immunity from taxation. Any disputes arising in connection with this Contract shall be settled by the mutual agreement of the parties, provided that failing such agreement; the dispute shall be finally settled by arbitration in accordance with the procedures set out in General Conditions Clause 52 then in effect, subject to the privileges and immunities of the Employer members which are specifically reserved. The parties agree to implement any requirements of the arbitrator(s) directed to them in accordance with those rules. For more information about Employer privileges and immunities please go to:[insert website]	**Non-Negotiable** Confirm Acceptance: Yes___/No___.
11.	**TERMINATION** Contract must have provision that allows Employer to terminate on reasonable notice and terms.	**Mandatory** Confirm Acceptance: Yes___/No___. Proposed Changes: Reason for Proposed Change:
12.	**WARRANTY** Contract must have provision.	**Mandatory** Confirm Acceptance: Yes___/No___. Proposed Changes: Reason for Proposed Change:

Item	Description	Bidder's Response
14.	**AUTHORIZED OFFICER** Employer will designate an authorized representative to make changes to the contract.	**Mandatory** Confirm Acceptance: Yes___/No___. Proposed Changes: Reason for Proposed Change:
15.	**ANTI-TERRORISM** Similar language to that provided below shall also be included in the Contract. Contractor and all SubContractor shall use reasonable efforts to ensure that funds paid to Contractor or SubContractor (s) by the Employer are not used to finance, support or conduct terrorism.	**Mandatory** Confirm Acceptance: Yes___/No___. Proposed Changes: Reason for Proposed Change:
16.	**INVOICING** Employer will provide specifics on invoicing instructions.	**Mandatory** Confirm Acceptance: Yes___/No___. Proposed Changes: Reason for Proposed Change:
17.	**NOTICES** Contract must designate the form of official notices.	**Mandatory** Confirm Acceptance: Yes___/No___. Proposed Changes: Reason for Proposed Change:
18.	**SOURCE CODE ESCROW** Upon request by the Employer, the Contractor shall place a copy of the Escrow Material into escrow.	**Mandatory** Confirm Acceptance: Yes___/No___. Proposed Changes:

Item	Description	Bidder's Response
		Reason for Proposed Change:
19.	**SOFTWARE UPDATES AND MAINTENANCE** Contract must specify maintenance service and product update provisions.	**Mandatory** Confirm Acceptance: Yes___/No___. Proposed Changes: Reason for Proposed Change:



KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 - DRAFT CONTRACTS

SYSTEM CONTROL AND SERVICE PROVIDER – SECTION 6.1.1 – SCHEDULE A – FARE SYSTEM

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

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1. Glossary

1.1. Abbreviations and Terms

The following abbreviations and terms are used throughout this functional/technical specification document and shall have the meaning attributed to it in this Glossary.

Please note that terms used in this document will at first be accompanied by an associated abbreviation in brackets where after the abbreviation will apply.

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
AFC	Automated Fare Collection
API	Application Program Interface
AVL	Automated Vehicle Location System
AVM	Automated Vehicle Monitoring System
BT	Barcode Ticket
BRT	Bus Rapid Transport
BDMS	Bus Depot Management System
BI	Business Intelligence
BIAS	Business Intelligence and Analysis Software
BoQ	Bill of Quantities
BPM	Business Process Management
CCH	Central Clearing House
CCTV	Closed Circuit Television
CIT	Cash in Transit
COTS	Commercial of the Shelf
CSC	Contactless Smart Card
CSC Emulation	Mobile Application (emulation)

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
CST	Contactless Smart Ticket
EFC	Fare System
DPI	Dynamic Passenger Information
EMV	Europay, MasterCard and Visa
FMC	Fare Collection Management Center
FVM	Fare Vending Machine
FS	Fare System
GoS	Government of Sindh
GPS	Global Positioning System
GTFS	Generic Front Feed Specification
GIS	Geographic Information System
GUI	Graphical User Interface
HHM	Hand Held Machine
ISO	International Organization for Standardization
ITS	Intelligent Transport System
KMS	Key Management System
KPI	Key Performance Indicator
L0	Level 0
L1	Level 1
L2	Level 2
L3	Level 3
L4	Level 4
LAN	Local Area Network

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
ms	Millisecond
MS	Mobility Scheme
MSP	Mobility Service Provider
NFC	Near Field Communications
OCC	Operations and Control Center
OBU	On Board Unit
OEM	Original Equipment Manufacturer
OFC	Optic Fiber Cable
PKI	Public Key Infrastructure
PKR	Pakistani Rupee
POS	Point of Sale
PT	Public Transport
PTO	Public Transport Operator
RAID	Redundant Array of Independent Disks
RFID	Radio-Frequency Identification
RFP	Request for Proposal
RTI	Real Time Information
RTPI	Real Time Passenger Information
SAM	Secure Access Module
SDC	Station/Depot Computer
SMTA	Sindh Mass Transit Authority
TOM	Ticket Office Machine
UMTS	Universal Mobile Telecommunications System

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
VIV	Vending, Inspection and Validation handheld device
VPN	Virtual Private Network
Contractor **(or ITS Contractor)**	The successful bidder who will enter into the Contract with the Employer to provide all Goods and Services Obligations required in terms of this Request for Proposal.
City	Karachi
Employer	Sindh Mass Transport Authority/ Transkarachi

2. Fare System Overview

2.1. Introduction

2.1.1. The ITS equipment and software is comprised of all intelligent transportation systems (ITS) deployed at the Operational Control Center, at the BRT stations, along the corridor, at the depots, and on-board the BRT vehicles.

2.1.2. The realization of the Fare System is one of the principal activities under the ITS Procurement. The Contractor will be responsible for operation and management of the collection and validation of passenger fare revenues.

2.1.3. The successful Contractor shall provide a full-featured and well-proven Fare System for Fare Management of the BRT vehicle operations. The Contractor shall ensure integration of the FS system into the Level 4 Fare Management Center (OCC) and shall operate and maintain the FS system in accordance with the specifications and requirements stipulated in this Schedule. The Contractor shall provide all Services (including support services) relating to the Fare System as stipulated in Schedule 6.2 (Services).

2.2. Fare Management Main Goals

2.2.1. The Fare System is the collection of components that automate the ticketing system of a public transportation network and manage the right-to-travels of the passengers.

2.2.2. The purpose of the FS is to enable the public transport operation through a platform for complex, safe and effective fare collection in public transport.

2.2.3. The FS will provide at least the following features:

a) Use barcode and contactless travel media;

b) Provide mobile ticketing;

c) Be capable of mitigating counterfeiting;

d) Manage multiple fare structures (distance, time-based fare, etc.);

e) Enable top-up value-added services and support internet purchase;

f) Enable the introduction of a fare cap or special discounts;

g) Be based on automated entry and exit gates at stations, stationary and handheld vending machines, office machines, inspection and validation machines;

h) Collect payment from passengers; and

i) Ensure effective revenue protection.

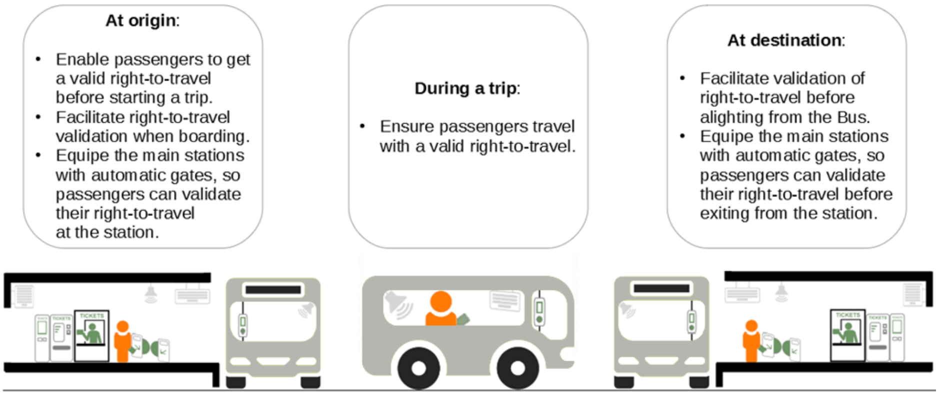
2.2.4. By means of the FS, passengers will mainly be able to:

a) Get a valid right-to-travel before starting a trip.

b) Validate their right-to-travel before starting a trip.

c) Let a conductor check the validity of their right-to-travel.

d) Validate their right-to-travel at the end of the trip, or at the point of transfer to other means of public transport.



At origin:

- Enable passengers to get a valid right-to-travel before starting a trip.
- Facilitate right-to-travel validation when boarding.
- Equipe the main stations with automatic gates, so passengers can validate their right-to-travel at the station.

During a trip:

- Ensure passengers travel with a valid right-to-travel.

At destination:

- Facilitate validation of right-to-travel before alighting from the Bus.
- Equipe the main stations with automatic gates, so passengers can validate their right-to-travel before exiting from the station.

Figure 1: Fare System overview.

2.2.5. The Fare System will be composed by the following equipment, which functionally will be organized in 5 hierarchical levels:

[**Level 0**] Fare Media: Smartcards, Smartphones and barcode tickets are expected fare media to be made available to passengers by the Fare System. These fare media are just the physical representation (embodiment) associated to a Fare Product, which is a transport service entitlement that will let passengers to get their right-to-travel after successful validation. Level 0 is specified by and provided by an agent of the Employer.

[**Level 1**] Stationary and On-Board equipment: passengers will be able to interact with Fare System at stationary locations, like stations, and on-board the BRT vehicles.

a) Sales: Different services will let passengers get access to Fare Products. Fare Products will be available for purchase at the BRT Website, Smartphone APP, Fare Vending Machines, Ticket Office Machines and Handhelds.

b) Validation: through the use of Automatic Gates, On-Board Validators and Handhelds, passengers will be able to validate their Fare Products and get the right-to-travel upon successful validation.

c) Inspection: Handhelds will be used by conductors to confirm that the media holds an appropriate right-to-travel.

[**Level 2**] Any systems to operate and manage Level 1 equipment on a station, and data concentration equipment: optionally, depending on the solution of the Contractor, specific equipment may collect information at stations and/or depots from Sales, Validation and Inspection Equipment, consolidating and transferring the data to the Level 3 back office systems.

[**Level 3**] L3 Fare Management Center (FMC): The servers and software to provide management and oversight of the Contractor’s Fare System.

[**Level 4**] L4 Fare Management Center: The Level 4 systems and services are to provide management and oversight of the Fare System. The L4 Fare Management Centre is not in scope of the the Contractor.

2.2.6. The following figure illustrates the aforementioned expected Fare System architecture:

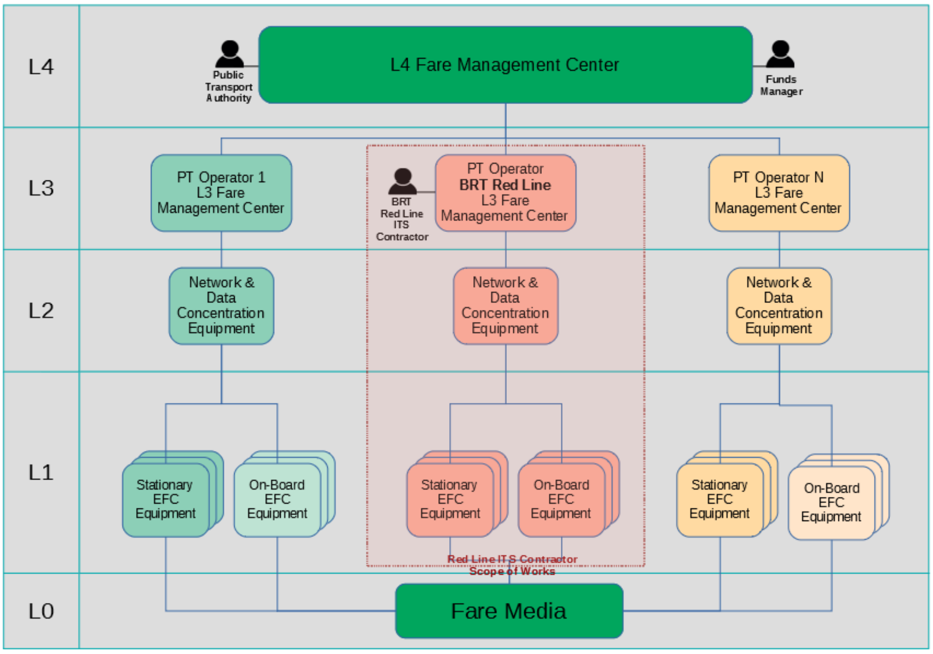

L4
Public Transport Authority
L4 Fare Management Center
Funds Manager
L3
PT Operator 1 L3 Fare Management Center
BRT Red Line ITS Contractor
PT Operator BRT Red Line L3 Fare Management Center
PT Operator N L3 Fare Management Center
L2
Network & Data Concentration Equipment
Network & Data Concentration Equipment
Network & Data Concentration Equipment
L1
Stationary EFC Equipment
On-Board EFC Equipment
Stationary EFC Equipment
On-Board EFC Equipment
Stationary EFC Equipment
On-Board EFC Equipment
Red Line ITS Contractor Scope of Works
L0
Fare Media

Figure 2: Fare System Layered Architecture

2.3. Roles and Responsibilities

2.3.1. Through the L4 FMC, the Employer, or an appointed representative, will define a common framework to be followed by the operators of different lines.

2.3.2. After acquiring data from the different lines, revenue clearing, fee computation and settlement between the lines and the passengers will be carried out by the L4 FMC.

2.3.3. The Employer, will be responsible for defining the fares, products and maximum price of services that the Contractor may charge the traveler related to fare collection.

2.3.4. The Employer will define the interoperable fare products and associated rules that passengers will have to follow when using those interoperable fare products all along the BRT.

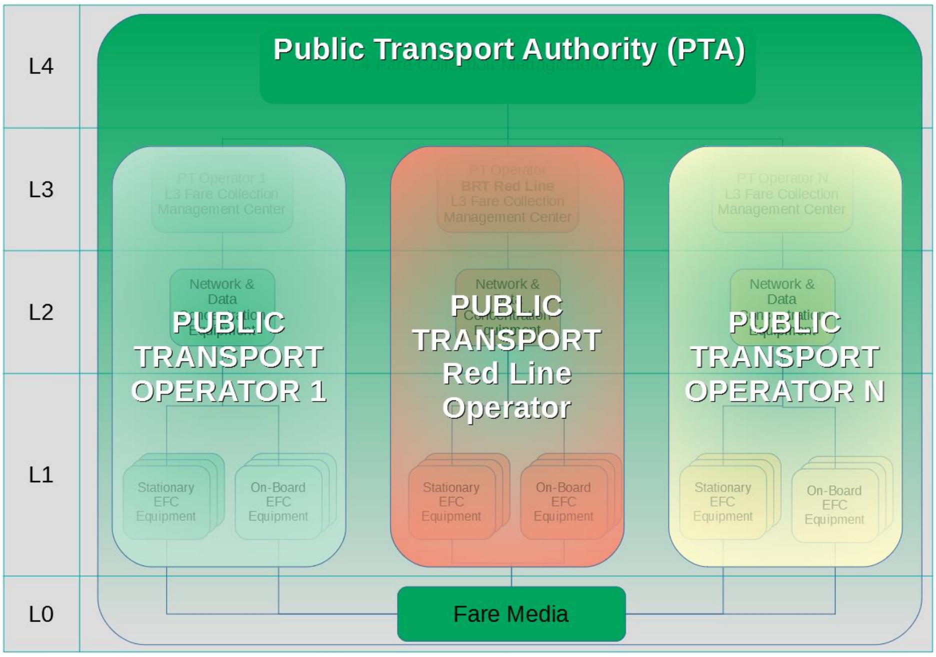


Figure 3: BRT Public Transport main actors

2.3.5. The Contractor must exercise the highest degree of skill, care and diligence in the provision of the BRT Red Line Fare System services and operate the BRT Red Line Fare System services strictly in accordance with the provisions of this Contract to the satisfaction of the Employer and in accordance with the standards normally expected of an Fare System operator.

2.3.6. The Contractor shall comply with and strictly adhere to the Employer’s instructions and directions from time to time regarding the operation of the Fare System. The Contractor will take instructions and directions only from a Representative of the Employer.

2.3.7. The Contractor shall coordinate with the responsible party for the architectural design of the stations to optimize ergonomics of all Fare System equipment within the respective rooms, air conditioning, data and power supply network, EMC requirements and areas respecting relevant standards. The complete arrangement shall ensure the architectural aesthetics and will be subject to the Employer’s approval.

2.3.8. Particular care shall be taken to the aesthetics and Human-Machine Interface of the Fare System (e.g. of gate and fare vending machines), which shall comply with HMI designs provided by the Employer, and will fit the overall aesthetics of the BRT station, including the signage.

2.3.9. **Fare collection**. Through a line of automatic gates in the stations, and through validation devices on the buses, passengers will get their right-to-travel by tapping their fare media. It is the Contractor’s responsibility to ensure that the complete and correct fares are collected at all times, and that transactions are cleared and paid in accordance to the Fare Policy defined by the Employer.

The Contractor must provide and manage pre-board fare validation at the BRT stations. The process involves managing the validators and Automatic Fare Gates prior to passenger entry into the closed station (paid) platform areas.

The Contractor must configure the direction of the automated gates to optimize the passenger flow during operating hours.

2.3.10. **Fare Media.** The BRT services may not accept any fare media as proof of payment for transport services unless the fare media is issued by the Contractor and approved by the Employer.

2.3.11. **Refusal of passenger entry**. The Contractor must not refuse to grant a person entry to a Station or BRT vehicle unless one of the following conditions apply:

a) The safety of the Station or BRT vehicle will be compromised at the time in question by the person wishing to enter;

b) Person refuses to pay or cannot pay the fare to enter the paid area of the Station or BRT vehicle;

c) Person does not comply with the security and safety regulations;

d) Person does not cooperate with Contractor personnel to establish compliance with the security and safety regulations;

e) Person exhibits violent or otherwise offensive conduct towards Contractor staff or other passengers; and/or

f) Occurrence of other reasons stipulated in applicable road traffic legislation.

2.3.12. **Fare Policy and Pricing**. The Employer will determine the fare media structure and price, which may vary from time to time. The Contractor shall ensure that the approved fare medias are Fare Products are sold to passengers at the price determined by the Employer. The Employer will retain all media branding rights.

2.3.13. **Sales services.** As part of its obligations, the Contractor is responsible for issuing and selling fare media to passengers, ensuring that there are a sufficient number of fare media sales and top-up facilities at the BRT stations and throughout the city.

a) The Contractor must ensure that all passengers are able to obtain fare media (e.g. smartcards. The Contractor must, furthermore, ensure that passengers are able to top up their fare media through different channels and can buy fare products as defined by the Employer.

b) Sale of fare media must be offered at least at the Station Ticket Offices, fare vending machines, and through third-party agents. Contractor shall not be responsible to realize third-party retail channels.

c) Fare Media top-up must be at least available via the same outlets as above and through online and mobile applications realized by the Employer.

d) Fare Media must be offered for sale by Contractor staff at Station kiosks, by Contractor conductors during operations on the off-corridor segments, by third-party entities at off-system locations and through the online and mobile application sales system. The Employer reserves the rights to advertising and revenue generated by advertising via Mobile applications.

e) The contractor shall develop the processes to manage the registration of the fare media, linking a fare media with a passenger, as per the policy of the Employer.

f) The Contractor is responsible for personalizing and distributing the fare media.

2.3.14. **Revenue Management.** The contractor must be responsible for the collection, secure management and transfer of all fare revenues into the Fare System.

2.3.15. **Cash Sales.** The Contractor:

a) Is responsible for the collection of all cash from the various point of sales as per the revenue indicated by the Fare System.

b) Must ensure that the cash is securely collected from the moment the payment is received from the passenger until the cash has been deposited into the account of the Employer.

c) Is responsible for collecting passenger payments, counting the cash collected, securely storing the cash, transporting the cash to the Contractor's bank, and depositing the cash in the Contractor's account. The Contractor will then transfer funds as agreed to the account of the Employer.

d) Is responsible for any cash lost or stolen while the cash is under the control of the Contractor (i.e. from receipt of the passenger payment to the transfer of cash to the account of the Employer).

2.3.16. **Credit/Debit Card Sales.** The Contractor is responsible for the collection, verification and transference of passenger payments by credit or debit cards. Sales performed using credit or debit cards may take place at the Station kiosks or through the Fare Vending Machines and/or online applications. On-board sales of single-use fare media will only be for cash.

2.3.17. **Validation of sales and revenues**. The Contractor must ensure that all sales and revenue generated are registered on point of sales devices in a manner that enables the Contractor to reconcile sales and revenue per operator shift and per sales device and location.

2.3.18. **Prevention of illicit revenue losses.** The Contractor must install and operate systems, methods, and processes to prevent, detect and recover losses caused by system failures and malicious intent, such as passengers evading fares and insider fraud.

2.3.19. **Distance-based fare.** The Contractor must ensure that the base fare concept is a distance-based fare, initially comprising a boarding fee of PKR 25 inclusive of four (4) kilometers travel, a fee of PKR 5 per 4 kilometers thereafter and capped at PKR 55. Employer reserves the right to change the value of fare and fare structure, i.e. a change to a flat fare concept; and

2.3.20. **Revenue transfer**. Notwithstanding the requirements above, the Contractor shall be liable to report to the Employer daily all fare sales and validations as registered by the Fare System.

2.3.21. **Revenue protection.** The Contractor must install and operate systems, methods, and processes to prevent, detect, and recover losses caused by system failures and malicious intent, such as passengers evading fares and insider fraud.

2.3.22. **Processing**. The Contractor must process all Fare System transactions, perform fraud analysis and detection, and send all transactions to the L4 FMC within the day. Transactions will be settled within 24 (twenty-four) hours from the close of business of the day during which the transaction occurred.

2.3.23. **Reporting.** The Contractor must provide comprehensive reports on the operation and maintenance of the Fare System.

2.3.24. **Settlemen**t. The Contractor will on a daily basis provide settlement reports to the Employer for daily settlement of revenues.

2.3.25. **Inspection Personnel.** The Contractor must:

Employ roving fare inspection personnel to inspect the validity of right of travel for passengers in the system, especially with regard to services on the off-corridor routes;

Assist the employer in the development of a fine/penalty mechanism for passengers who fail to produce evidence of their right to travel; and

Implement the fine/penalty mechanism in the manner agreed upon with the employer.

2.3.26. **Conductors.** The Contractor must provide sufficient on-board fare conductor services in the BRT vehicles during operating hours. For this purpose, the Contractor would use one female and one male conductor on-board BRT vehicles when applicable. The responsibilities of these conductors would be as follows:

Act as a security guard on the BRT vehicle, ensuring that all boarding passengers are checked for hazardous items prior to boarding the BRT vehicle;

Act as a sales representative by offering the selling of single-use fare medias;

Ensuring that all passengers alighting the BRT vehicle do not check-out prior to setting the mobile inspections and validation device to the correct stop where passengers are exiting; and

Ensuring that all passengers boarding have a valid right to travel, either through successful validation of a fare media or sales of a single-use fare media.

2.3.27. **Staffing.** The Contractor is responsible for all Fare System related personnel, including hiring the cashiers and service personnel in the stations. The Contractor must ensure that the Ticket Offices located at all stations are staffed with trained personnel and will provide services to passengers during BRT operating hours. The number of personnel required and their associated skill requirements (responsibilities) must be such to ensure that they can execute the following tasks:

a) Fare media registration and deregistration;

b) Lost and stolen fare media processing;

c) Fare Medias and Fare Products sales;

d) Fare Product top-up sales;

e) Registration and follow-up of complaints;

f) Registration and handling of passenger claims due to faults with the fare media;

g) Passenger service inquiries related to fares, products, use of the fare media, equipment, top-up methods, etc.; and

h) Potential partial refunds of Fare Products in case of BRT service malfunctions.

2.3.28. **Availability.** The Contractor must guarantee the availability of these sales services during BRT operating hours. Should any passenger, for any reason attributable to the Contractor, not be able to acquire fare media or add stored value or procure a single-use fare media, the passenger must be granted access to the system free of charge and the Contractor must bear the cost of the fare lost at the full fare in force. The Contractor will guarantee that during operation and at each Station, personnel will have an adequate stock of fare media to attend to the demands of the passengers and system. The Contractor must provide point of sales as necessary, with banknotes and coins of all denominations required to deliver the required change.

2.3.29. **Receipts and account summary**. If requested by the passenger, the Contractor must provide a printed fare payment receipt or a printed account summary (i.e. overview of past trips and account balance). The Contractor must also enable the passengers to access their personal account summary via the system website.

2.3.30. **Faults Monitoring.** Levels 1-3 equipment must have mechanisms which allow it to detect faults internally, and communicate them immediately to the Contractor.

2.3.31. **Communicating Fare System outages**. The Contractor must collaborate with the Employer in the event of Fare System disturbances of operation. The Contractor must inform passengers of any problems with the Fare System prior to the receipt of payment, if the situation so requires. The Contractor must also inform the Employer if such an event occurs. The Contractor must also use the public announcement system available at each station to communicate any general Fare System issues.

2.3.32. **Processing and settlement audits.** The Contractor must fully cooperate with the assigned information system auditor and extend all the necessary access, support and cooperation for the completion of audits (as and when required).

3. Fare Policy

3.1. Configurability

3.1.1. The FS will at least support the following general concepts and features described hereunder.

3.1.2. All concepts introduced in this section shall be fully parametric such that configuration changes can be performed by Contractor through their L3 and L4 FMC infrastructures as indicated hereunder and as may be required by the architectural design.

3.1.3. Rules defining the use of fare products, fares and discount rules will be configurable, allowing for an easy extension of the BRT system.

3.1.4. The final concepts and specifications are part of a package provided to the Contractor by the Employer.

3.2. Interoperability Concepts

3.2.1. The Fare System will be capable to manage the fare products defined in the interoperable system and accept the Fare Media issued by the Level 4 FMC. The final concepts and specifications are part of a package provided to the Contractor by the Employer.

3.2.2. In order to ensure proper interoperability framework, the FS will follow the architecture and requirements defined by the international standard ISO 24014.

3.2.3. Passengers with a valid interoperable fare product will be able to seamlessly travel all along different operators and modes of transport.

3.2.4. **Paid area** means any BRT vehicle and the sections within a station that requires a right-to-travel to obtain access.

3.2.5. At stations, the paid area and the unpaid area will be separated by an Automated Fare Gate line, i.e. a series of automatic gates, only granting passage from unpaid to paid area upon payment of the fare.

3.2.6. A right-to-travel will be obtained by a passenger when the entry fare validation device (Automated Fare Gates at Stations and On-Board Validators in BRT vehicles) selects a valid Product and/or deducts stored value.

3.2.7. To obtain a right-to-travel, passengers must present its fare media to a device performing validation, such as automatic gates, validators, and mobile inspection devices.

3.2.8. To obtain a right-to-travel, passengers must present its fare media to the available fare validation equipment before entering to the Paid Area (check-in).

3.2.9. Passengers must be able to show their fare media as proof of right-to-travel. Contractor's employees will inspect the fare media to confirm passengers' right-to-travel in the paid area.

3.2.10. Passengers will be requested to present their fare media with a valid right-to-travel to the available exit fare validation equipment before leaving the Paid Area (check-out).

3.2.11. Upon exiting the paid area, the actual fare will be calculated and deducted from the corresponding Fare Product or appropriate account.

3.2.12. Male passengers may board the rear door of a BRT vehicle after a security check by a male on-board conductor. Female passengers board through the front door of a BRT vehicle after a security check by a female on-board conductor.

3.2.13. The BRT system consists of multiple **Stop-Points**. Each Stop-Point reflects one station within the corridor. Each stop-point belongs to at least one route. The typology must support a Stop-Point belonging to multiple routes.

3.2.14. A **Trip** is a segment of a trip involving a stopover, change of bus vehicle (even if two buses belong to the same transit service provider), or change of line/vehicle operator. A Trip will always start with a check-in validation and ends with a check-out validation.

3.2.15. A Transfer is considered the act of exiting from the ~~Public Transport System~~BRT system and entering again, between two ~~Trip Legs~~Trips of the same ~~Trip~~Journey, within the conditions that allow a Transfer to take place.

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3.2.16. A ~~Trip~~Journey is a chronological sequence of ~~trip legs~~trips and transfers performed by a passenger through the interoperable transport system.

3.2.17. Following this convention, a ~~trip~~Journey will be composed by one or more consecutive ~~trip legs~~trips and passengers will transfer between two ~~trip legs~~trips.

3.2.18. Maximum journey time, maximum trip time, maximum ~~leg time, maximum~~transfer time ~~between trip legs and maximum number of legs per trip~~ will be parameters specified by the ~~Fare System~~Level 4 FMC.

3.3. Fare Media

3.3.1. Fare ~~Medias~~Media are the physical representation (embodiment) of the fare product, which is a transport service entitlement that will let passengers to get their right-to-travel upon successful validation.

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3.3.2. At least the following ~~fare media~~Fare Media will be implemented in the Fare System~~ making possible to the Public Transport Operator to enable or disable in the L3 FMC what of the following fare medias will be available for passengers and at what time~~:

a) Contactless Smart Card (CSC)
b) Barcode

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3.3.3. The functionality of the Fare Products will be configurable and in accordance with the rules and parametrization defined at L4 FMC.

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3.3.4. The following payment methods for purchasing fare ~~medias~~media and fare products will be available:

~~c)~~a) Bank Notes
~~d)~~b) Coins (only at ~~TOM~~Ticket Office Machine)
~~e)~~c) Bank Cards (Credit or Debit) and equivalent digital wallet available in the country (Apple Pay, Google Pay, Samsung Pay, etc.)
~~f)~~d) Mobile money ~~provider~~providers

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3.3.5. The only permissible currency will be PKR (Pakistani Rupee).

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3.3.6. The acceptance of means of payment different than cash will be subject to the transaction amount ~~(parameterized).~~.

3.3.7. The acceptance of bank notes denominations will be subject to the transaction amount ~~(parameterized).~~.

~~3.3.2.~~3.3.8. On request after any purchase, a receipt or equivalent proof of the payment will be issued to the passenger.

3.4. Single-Journey Fare Product

3.4.1. A single-journey will be a ~~Non-Monetary~~ fare product valid for a configurable short period of time, enough to perform a single journey~~ (typically 2 hours).~~.

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3.4.2. A single-journey will be:

~~3.4.1.~~3.4.3. Represented on a smartphone using a 2D-barcode.

~~3.4.2.~~3.4.4. Valid for entry in the location of the purchase only.

~~3.4.3.~~3.4.5. Valid on the day of sales (temporal validity) only.

~~3.4.4.~~3.4.6. Valid for a single entry into the paid area only.

~~3.4.5.~~3.4.7. A single-journey will not be used to implement concessionary discounts

3.5. Monetary Fare Product

3.5.1. One single ~~Monetary Fare~~Stored Value Product will be loaded in contactless media. No more than one ~~Monetary Fare~~Stored Value Product will be stored in the same CSC. This ~~Monetary Fare~~Stored Value Product will not have starting date and will be valid upon issuance of media.

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3.5.2. ~~Monetary Fare~~Stored Value Products are not permitted in ~~Barcode~~barcode media.

3.5.3. Stored Value (SV) refers to the number of transport credits purchased initially by a passenger, or the residual value remaining in the media after usage, linked to one instance of ~~Monetary Fare~~Stored Value Product. This Stored Value will be used for the deduction of travel fare in the BRT transit system upon validation.

~~3.5.1. Nothing in this provision shall be construed as limiting the use of Stored Value as payment for public transport services only.~~

~~3.5.2. Negative values for the SV will not accepted.~~

3.5.4. ~~The Monetary Fare~~The Stored Value Product will be an interoperable product which can be used for services all along the Karachi BRT Lines.

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3.5.5. When validating the fare media for the first time on a trip (first check-in validation), in case there is no valid ~~Non-Monetary~~ Fare Product associated to the fare media, a boarding fee will be deducted from the Stored Value. If the balance is sufficient, a right-to-travel is granted. If the balance is insufficient, no entry is granted. This means that if the balance on the card is less than the fare required exit is denied until top-up has occurred within the paid area;

3.5.6. If a passenger has insufficiently stored value to pay the boarding fee, the passenger must top-up the stored value before being allowed entry to the paid area; and

3.5.7. At check-out validation, the actual fare will be calculated. If the fare is higher than the boarding fee, the difference will be subsequently deducted; If the actual fare is lower than the boarding fee, the difference will be refunded by increasing the SV balance.

3.5.8. Entry and exit validations will have to be used in the correct sequence. Every entry validation must be followed by an exit validation and every exit validation must be preceded by an entry validation. Not following this sequence will result on applying a configurable fine to the passenger upon next presentation of the fare media.

~~3.5.3. Entry / Exit Sequence Check shall not be applicable to Barcode Smartphones as barcode is a read-only fare media.~~

3.5.9. It shall also be possible to configure the gates at selected or all stations from the ~~Interoperability Management Center~~Level 3 FMC to suspend the entry/exit sequence check and reactivate the check whenever it may be necessary.

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3.5.10. When validating the Stored Value for the first time during a trip, one ~~Non-Monetary~~ Fare Product, equivalent to “Single Ride” fare, will be instantiated for the first journey leg. During the Single Ride validity period, subsequent legs will not imply any further deductions.

3.5.11. The minimum and maximum top-up value will be configurable.

3.5.12. The minimum and maximum Stored Value balance will be configurable.

3.5.13. All stored value sales between the minimum top-up value and the maximum top-up value with increments of PKR 5 and PKR10 will be supported;

3.5.14. The price of a trip using Stored Value will be determined as follows:

There must be a nominal price for a trip (***P***) in PKR. At least, it will be possible to define the nominal price as comprised by a boarding fee (BF) and a ~~[*value to be defined*]~~ four-km-based fare~~.~~ (Round Down(km/4)*Pkm). The boarding fee must be inclusive of x km and the total price is capped at y PKR. P = min ((y, max (BF, (Round Down(km/4) - x)*Pkm, where Round Down means rounding down to the nearest integer;

No transfer fees will be deducted for Transfers between routes within the BRT system;

Trip prices may be discounted automatically for all passengers during specified times of day or day of the week. The discount (***Di***.) will represent a nominal discount in PKR;

The trip price may be discounted due to a discount associated with the fare media. The discount (***Dfm***) will be a percentage of the fare;

For each trip, the fare must be determined as the nominal price for the trip P minus the off-peak discount Di (when applicable). If a valid discount product is present on the Fare Medium, a percentage of the fare above will be subtracted from the fare; and

~~3.5.3.1.~~3.5.14.1. ***Fare*** = Round***((P – Di)*** – (***P*** – ***Di***) x ***Dfm***)), where Round() means rounding up to the nearest whole PKR;

3.6. Non-Monetary Fare Products

3.6.1. ~~A Non-Monetary~~A Fare Product will be a service entitlement, not based on Stored Value, valid for unlimited or capped services (for example, limiting the number of journeys) during a period of time that may be purchased and associated to a fare media.

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3.6.2. CSC will support at least 2 (two) ~~Non-Monetary~~ Fare Products, however the actual quantity of ~~Non-Monetary~~ Fare Products shall be configurable.

3.6.3. In the event that multiple ~~Non-Monetary~~ Fare Products are associated with a fare media, a configurable priority will be assigned to each Fare Product.

3.6.4. In case several ~~Non-Monetary~~ Fare Products are applicable during a validation, the valid Non-Monetary Fare Product with highest priority will be considered during the entry validation of the fare media.

3.6.5. All the ~~Non-Monetary~~ Fare Products will be interoperable Fare Products, therefore valid for services travelling all along the BRT System.

3.6.6. CSC ~~Non-Monetary~~ Fare Products will be reloadable in advance to allow uninterrupted use. By reloading a CSC ~~Non-Monetary~~ Fare Product, passengers will be able to extend the time validity before it is expired.

3.6.7. If a CSC ~~Non-Monetary~~ Fare Product is reloaded before the expiry date, the new validity date of the new fare product will continue from the expiry date of the existing fare product without forfeiting the balance of days.

3.6.8. ~~Non-monetary products~~Fare Products are sold "as it is", this means that it will not be possible to modify the time validity during usage (e.g. reduce to 4 days the validity of a weekly fare product).

3.6.9. The time validity of ~~Non-Monetary~~ Fare Products will be configured by the L4 FMC to start at the time of the load, on the first validation after the issue or at a specific fixed day.

3.6.10. Time validity of a ~~Non-Monetary~~ Fare Product will be defined by a quantity of hours, days or months.

3.6.11. Price and the rest of characteristics of ~~Non-Monetary products~~Fare Products will be independently configurable per product.

3.6.12. Under passenger request, an active ~~Non-Monetary~~ Fare Product could be overwritten with another ~~Non-Monetary~~ Fare ~~Products~~Product. Overwriting the active fare product will imply the termination of the current fare product and the issue of a new one.

3.6.13. It will be possible to define and make available to passengers at least 64 ~~Non-Monetary~~ Fare Products, like the following examples:

a) Single Ride Pass: time validity 2 hours.
b) Daily Pass: time validity 1 operational day.
c) Weekly Pass: time validity 1 week.
d) Monthly Pass: time validity 1 month.
e) Yearly Pass: time validity 1 year.

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3.7. Contactless Smart Card (CSC)

3.7.1. Contractor may procure CSCs from the Employer.

3.7.2. The CSCs shall be sold with a ~~Monetary Fare~~Stored Value Product, containing a minimum amount of transport credits in its Stored Value electronic purse (also named SV), which allows the commuters to do away with the need of carrying cash by deducting the amount defined on fares configuration from the SV.

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3.7.3. The CSCs can be sold with a ~~Non-Monetary~~ Fare Product ~~(Time Range)~~ valid to travel in the interoperable fare collection system for a specific time.

3.7.4. Whenever a ~~non-monetary product~~Fare Product, present in the CSC, is valid to start a ~~leg, the Non-Monetary~~trip, that Fare Product will be used to perform the trip ~~leg~~.

~~3.7.1.~~ CSC will be sold by Contractor at least at stationary point of sales (~~TOM, FVM, and others).~~

3.7.5. ~~All~~ticket office, fare vending machines).

~~3.7.2.~~ Fare media ~~must~~may be registered or personalized to a person or specific passenger. ~~For all passengers 18 years and older, except for Single fare media. A passenger's national ID (card) must be~~

~~used as primary identification for~~ It is up to the Employer to determine the registration~~. For all passengers younger than 18 years, either the school ID is registered, or~~ requirements and proof of identity requirements. The Contractor may need to connect to the ~~passenger must be accompanied by an adult, and the card is registered to the adult. The Fare Systemdoes not provide for anonymous fare media.~~

~~3.7.3. Registration services will at least be offered at all manned fare media outlets and Fare Vending Machines and possibly also on websites once fare media sales through~~ Level 4 FMC for this ~~channel are introduced.~~

3.7.6. ~~The Fare Systemwill securely store passenger's personal details submitted on~~ registration ~~forms along with a record of what documentary evidence was provided with the~~ , but shall at least provide registration ~~forms.~~ services (if applicable) at ticket offices.

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3.7.7. Passenger personal details ~~will~~may comprise of a unique subset of: name, address, home phone number, cell phone number, day time phone number, e-mail address, gender, date of birth, discount entitlement, proof of discount entitlement (e.g. ID number), and the expiry date of entitlement.

3.7.8. Contractor shall be able to obtain CSC personalization devices from the Employer.

3.7.9. The purchase price of a CSC will comprise at least the following four components to be defined at the L4 FMC:

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a) CSC Cost: This will be parameterized and non-refundable.

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b) CSC Deposit: This will be parameterized so it can be refundable depending on the type of CSC.

c) Personalization Fee: The personalization of a CSC will be optional. The personalization fee will be non-refundable.

d) Fare Product tariff: refundable as per the active refund policy defined by the L4 FMC and as long as the fare product is not used.

3.7.10. If the ~~Non-Monetary~~ Fare Product is not present or is not valid to start a ~~leg~~trip, the ~~Fare System~~fare validation equipment will try to perform the validation on the ~~Monetary Fare~~Stored Value Product. In case no sufficient balance is available from the ~~monetary fare~~stored value product, the validation will not be possible and the contactless media is rejected.

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~~3.7.4. The configurable parameter for the validity of CSC will be set initially to 5 years from the initialization date. This validity time must be configured according to the card supplier recommendations in order to avoid malfunctions on the media due to the usage.~~

~~3.7.5. CSCs that are neither registered nor personalized are also named Anonymous CSC, as they do not contain personal information.~~

3.7.11. By default, every CSC ~~issued by TOM or FVM~~. will be issued anonymous. Therefore, at the time of issue, no personal passenger information is printed or stored into the smart cards.

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~~3.7.6. Anonymous CSC can be charged with a CSC deposit that could be refundable depending on the L4 FMC directives.~~

~~3.7.7. Even though, at the issue operation, by default, no personal passenger information is available in back office, later on, passengers will be able to registered their cards at the L4 BRT Website provided by a third party (not part of the Contractor scope of works).~~

~~3.7.8. CSC Registration is the process of incorporating personal data to a Contactless Smart Card (CSC), linking a specific fare media to a passenger.~~

~~3.7.9. CSC Personalization is the process, additional to the CSC registration, by which personal data can be physically printed onto the fare media.~~

~~3.7.10. Personalization becomes mandatory in case a passenger would like to load into his CSC discounted fare products (i.e. concessions). Once the passenger´s profile is set into the CSC through the registration process, and the externally additional personal data are printed, the CSC becomes personalized.~~

~~3.7.11.~~3.7.12. Passengers with registered and/or personalized media will be able to access to the replacement of a lost media: After the corresponding fee (configurable at the L4 FMC) and according to the business rules, registered patrons will be able to receive a CSC equivalent to the lost one or complete the migration of the user account to the new fare media.

3.8. Other Concepts to be supported by the Fare System

3.8.1. The Contractor shall ensure that the Fare System can cope with at least the following Temporal Parameters:

- i. Calendar Concepts:
  - a. Holidays;
  - b. Weekdays (Monday – Friday);
  - c. Weekend days (Saturday – Sunday);
  - d. Calendar days (both Gregorian and Hijri); and
  - e. Week, Month, Year;
- ii. Day types can be combined in most ways. Calendar days are assigned to holidays, days of the week to weekday and weekend days, etc.;
- iii. Time periods in which each time period has a start-time and an end-time:
  - a. Time (i.e. hh:mm:ss); and
  - b. Time periods can be linked to Calendar Concepts ((e.g. ‘Period Off-peak 1’ (9:00 am – 11:59 am) to ‘On-peak Days’));
- iv. Validity Period concepts:
  - a. Fixed Validity Period (Linked to a start Time Concept and/or Calendar Concept and an end Time Concept and/or Calendar Concept, or a start Time Concept and/or Calendar Concept and a Duration Concept);
  - b. Sliding Validity Period (Linked to a start Time/Day Concept (determined at first usage of the product) and a duration concept); and
- v. The validity periods define the limits to the temporal validity of the Product.

3.8.2. Product usage concepts:

- i. Unlimited product usage means that within the Validity Period, there is no limit on the number of trips; and
- ii. Limited product usage means that within the validity period, the usage of the product is limited to a number of trips.

3.9. Lost or Stolen fare media:

3.9.1. If a registered fare media is stolen or lost, a passenger will be able to report this to the Contractor ticket office, call center, or website.

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3.9.2. Any stored value spent with this lost or stolen registered fare media for fares up to ~~2 hours~~1 hour after reporting the fare media theft or loss, shall be for the account of the passenger. Any stored value spent after ~~2 hours~~1 hour of the report of the loss or stolen fare media shall be for the account of the Contractor.

3.9.3. To minimize the loss of revenue, the ~~Fare System~~Contractor's Level 1 shall blacklist, block FS must be able to blacklist fare media within ~~60~~10 minutes of reporting a ~~lost~~lot card or fare media fraud.

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~~3.9.1.~~3.9.4. If the passenger acquires new fare media, the passenger will be able to transfer the remaining stored value to the newly issued fare media. The Contractor shall ensure that there are sufficient locations that offer this passenger service.

3.10. Concessionary and Discount Fare Products

3.10.1. A concessionary passenger is a passenger whose characteristics make the passenger eligible for a concessionary discount.

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3.10.2. Concessionary Products supported in the Fare System must include ~~Monetary Fare Products~~Stored Value and ~~Non-Monetary~~ Fare Products.

3.10.3. Concessionary discount will implemented as a product providing a discount on the nominal price of non-monetary fare products or to each trip fare deducted from the stored value.

3.10.4. Passengers who claim the right to obtain a Concessionary Product must register their required details in the ~~Fare System~~FS and furnish personal information at a fare sales office at a station by submitting a registration form. The concessionary product will be made available to the qualifying passenger at the same place no later than seven (7) days after submission of the registration form, will the passenger qualify for the discounted travel in terms of the concessionary rules.

3.10.5. The Fare System will enable the implementation of Employee Fare Products as one more type of Concessionary Products.

3.10.6. Employee products may only be made available on registration of the employee and associated fare media to persons governed by Employer and may provide unlimited trips within the BRT system;

3.10.7. The Employer shall govern the eligibility criteria for Concessionary Fares in accordance with applicable laws in Pakistan or in accordance with any contractual arrangements between the Employer and the Contractor.

3.10.8. The Fare System must be able to support at least six (6) different groups of concessionary passengers.

3.10.9. Concessionary products must at least be made available from the fare sales booth located in stations.

3.10.10. Concessionary products will be only provided to passengers who are registered in the system.

3.10.11. Each passenger eligible for concessionary travel will not have more than one fare media associated with a concessionary product.

3.10.12. A check-in with a concessionary product must be audibly and visually distinguishable from non-concessionary validations.

3.10.13. Passengers who qualify for concessionary products will pay the regular price to obtain a ~~system Smart Card~~CSC.

3.10.14. The Contractor will confirm whether the passenger applying for the concessionary product does not already have an active concessionary product associated with the passenger prior to activating a new concessionary product associated with the applying passenger.

3.10.15. A blocked registered fare media or concessionary product must be able to be unblocked at a fare sales office after de-registration and removal of an existing concessionary product, where after the fare media must be reusable by a passenger.

3.10.16. Additionally to Concessionary Fare Products, the Fare System will support Discount Fare Products.

3.10.17. Discount Fare Products will provide a percentage discount on Trips, rounded up to the nearest whole PKR.

~~3.10.1.~~3.10.18. The distinction between discount products and concessionary products is that eligibility for a concessionary product is governed by law, eligibility to discount products is governed by commercial agreements between Employer and passengers.

3.11. Faulty Fare Media

3.11.1. Faulty fare media refers to a fare media that is or has become unusable due to inherent defect or damage sustained from interaction with the Fare System not due to the fault of the passenger.

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3.11.2. The Contractor personnel must determine whether the reason for inoperable fare media is a technical fault~~. If the data on faulty fare media prior to their end date are still readable by a point-of-sales or can be reconstructed using the Contractor's records, these contents shall be transferred to or associated with the new system smart card through a point-of-sales. The smart card shall be replaced free of cost to the passenger, if the fare media was faulty due to the fault of the Contractor~~ and will follow policies and procedures obtained from the Employer to determine whether the Passenger is at fault or the Employer.

3.11.3. The Contractor must replace any faulty fare media free of charge to the Passenger and transfer the stored value balance, if any, to new card and return to passenger within a maximum of five working days.

3.11.4. Once the fare media is replaced, passengers will receive a receipt summarizing the transaction performed.

3.11.5. The Contractor will collect all fare media cards that are broken, returned or otherwise end-of-life; and ~~arrange the environmentally friendly disposal of the fare media in accordance with existing environmental laws, rules and regulations.~~

return these to the Employer for further analysis.

3.11.6. ~~Level~~The Contractor shall be compensated for replacing faulty fare media by the Employer. The compensation shall be equivalent to the price at which the Contractor can obtain fare media from the Employer

4. Level 4 FMC (Fare Management Center)

4.1. Introduction

4.1.1. The L4 FMC, which will be realized, operated and maintained by (an agent of) the Employer.

4.1.2. The Fare System to be supplied by the Contractor will be fully integrated with the L4 FMC ~~supplied by a third party~~.

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4.1.3. The following table summarizes the main sub-systems and functionalities of the L4 FMC:

L4 FMC SUB-SYSTEMS	MAIN FUNCTIONALITIES
CENTRAL CLEARING HOUSE (CCH)	• Interoperable Media Management • Interoperable Media Stock Supervision • Equipment Management • Interoperable Fare Products Management • Interoperable Fare (Tariff) Management • Layout Management • Clearing Revenue & Apportionment • Transport Network Topology Management • Lists Management • Action List distribution mechanism
CUSTOMER RELATIONSHIP MANAGEMENT SYSTEM (CRMS)	• Customers Database • Contact Center
BUS RAPID TRANSIT WEBSITE & MOBILE TICKETING SERVICE	• Transit Website/APP & Customer Care Web Portal
KEYS & SECURITY MANAGEMENT SYSTEM (KMS)	• Key Management • Security Management
SMART CARD PERSONALIZATION CENTER	• Smart Card Personalization
REPORTING & ANALYSIS	• Reporting

Table 1: L4 FMC Sub-Systems and Main Functionalities

4.2. Central Clearing House (CCH)

4.2.1. The L4 FMC will interact with the different L3 FMC systems, comprising the total BRT system apportioning of revenue.

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4.2.2. **Interoperable Media Management.** L4 FMC will contain the master database of all fare media/cards issued by stakeholders available for use in the system. Each individual card has a unique identity and will be tracked from its initialization until its termination when it will be deactivated in the database.

4.2.3. The L4 FMC will receive from the ~~Mobility Service Providers~~Contractor the transaction records and will store the updated status of fare medias and Fare Products.

4.2.4. **Interoperable Media Stock Supervision.** The L4 FMC will be equipped with a stock management utility which will help the ~~Public Transport Authority (PTA)~~Employer to track smart card/ticket movements in the BRT system.

4.2.5. **Equipment management.** The L4 FMC will manage and initialize all equipment IDs and associated SAMs for BRT.

4.2.6. **Interoperable Fare Management.** The L4 FMC will be equipped to manage all interoperable products, the corresponding parameters and allocation of Product IDs among product owners/Passengers.

4.2.7. **Fare structure.** The L4 FMC system will facilitate modification of system operating parameters that can be subject to a future change, allowing the stakeholders to adjust fare policy in a secure way.

4.2.8. **Fare Management Database.** The fares will be stored in a database in a structured form.

~~4.2.1. **Layout Management.** The L4 FMC will make available to each transport operator a graphic editor for the design and processing of the layouts of the printed receipts or electronic card layouts.~~

4.2.9. **Clearing Revenue & Apportionment.** The Central Clearing House (CCH) will be the central node for all incoming revenue. A detailed reporting system regarding revenue from the different sources and its apportionment will be prepared daily and distributed to all participating operators and will include information on:

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a) L3 FMC systems ~~(PT operators);~~;

b) CCH's apportionment information and journey recreation; and

c) Resellers or similar top-up facilities.

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4.2.10. **Supervision Performance Criteria**. Performance data will be collected in the L4 FMC to determine compliance to KPIs for all operators considering timeliness, passenger satisfaction, cleanliness, schedule adherence etc.

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4.2.11. **Calculation Split of Revenue**. The L4 FMC (via the CCH function) will perform revenue apportionment between operators based on the following parameters:

~~d)~~a) Revenue captured per each stakeholder in their own Points of Sale devices;

~~e)~~b) Revenue captured by common portals (e.g. ~~Mobile device~~mobile ticket or internet);

~~f)~~c) Revenue captured by resellers;

~~g)~~d) Common costs;

~~h) Performance indicator per each Public Transport Operator (PTO);~~

~~i)~~e) Adjustment factors to compensate special efforts;

~~j)~~f) By line (route);

~~k)~~g) By mode e.g. BRT;

~~l)~~h) By product e.g. Single Ride, Weekly Pass, Monthly Pass;

~~m)~~i) By number of passengers; and

~~n)~~j) By validation and check-in/check-out (balance, distance, etc.).

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4.2.12. **Accounts daily position.** The L4 FMC will collate and maintain the daily position with each individual account by journey reconstruction and apportionment between Operators:

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~~o)~~a) Input: Check-in Station X and Check-out Station Z, Check-in Station Z and Check-out Station Y; and

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~~p)~~b) Output: Trip Route A from Station X to Station Z and Route B from Station Z to Station Y.

~~4.2.2.~~4.2.13. **Transaction Management**. The L4 FMC will at least comply with the following transaction management functional requirements:

The L4 FMC will only process ticket usage transactions uploaded to it by the L3 ~~AFMCs~~FMCs;

L4 FMC will validate each uploaded transaction to ensure its validity, authenticity and accuracy;

In degraded mode the L4 FMC will be able to manually import transaction files as an alternative means of placing transaction files into the CCH; and

L4 FMC will also receive summarized usage information from the L3 ~~AFMCs~~FMCs and it will consolidate the summaries from all L3 ~~Fare System (EFC)s~~FMCs.

4.2.14. **Transport Network Topology Management**. This functionality will enable the ~~Public Transport Authority (PTA)~~Employer to define the network of the Interoperable Public Transport System, including at least the following elements:

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Equipment Location, the slot or physical space where ~~an~~a Fare System device can be installed.

Location Points, representing geographical points where Fare System devices can be located or vehicles can stop for boarding/un-boarding, such as:

a) Stopping points like Bus Shelters

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b) Concourses

c) Station Hall

Locations, as a group of Location Points to identify and describe places like:

d) BRT Stations

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e) Bus stops

f) Depots

g) Sales Offices with TVS

h) Third Party Shops with TVS

Lines, representing the regular service provided by ~~Public Transport~~BRT vehicles as a sequence of ~~Locations~~stations.

Zones, as a collection of ~~Locations~~stations used to apply different tariff rules.

Vehicles, where ~~Fare System~~fare system devices can be located on-board.

Matrix of distances between Stations, allowing ~~PTA~~Employer to configure both the distance between stations and the lines associated between an origin and a destination for the revenue split calculations.

A unique code will be assigned by the L4 FMC to all the network topology elements and shared with the Public Transport Operators through the L3 FMC.

4.2.15. **Lists Management**. Action lists including a CSC blacklist with CSC serial numbers to be rejected by the ~~Fare equipment~~FARE SYSTEM Equipment will be shared with the different L3 FMC so ~~Fare~~FARE SYSTEM equipment can deal with the CSC accordingly.

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4.2.16. The **Auto Top-Up Service** will make possible to reload automatically fare products already associated with a fare media.

~~Non-Monetary~~ Fare Product will be auto-reloaded (renewed automatically) once it is not valid, this is after expiration.

~~Monetary Fare Products are~~Stored Value is auto-reloaded after the stored value falls below a threshold defined by the passenger at the moment of the subscription.

Passengers will be able to apply to the Auto Top-Up Service via the BRT Website, Smartphone APP and other point of sales. The Auto Top-Up Service would be activated upon approval by the corresponding Bank.

The Fare ~~Systemwill~~System will allow necessary integration to make the Auto Top-Up available to passengers.

~~4.2.3. Fare SystemInterfaces.~~ The ~~L4 FMC~~Action List Service will ~~interface with~~ allow the ~~different L3 FMC~~validation and ~~finance Institutions via~~sales devices in the ~~corresponding interfaces. The L4 FMC will at least:~~

~~4.2.4. Gather CSC/CST usage transactions information;~~

~~4.2.5. Provide system or global parameters;~~

~~4.2.6. Provide date/time information for synchronization;~~

~~4.2.7. Respond to POS requests for refunds and replacements; and~~

~~4.2.8. Respond to POS/FVM requests for Bank~~ Fare System to update the CSC in accordance with top-ups~~.~~

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~~4.2.9. Respond to Refund/Replacement requests and other passenger Issues to be managed by the Public Transport Operators.~~

4.2.17. ~~Finance System. L4 FMC is expected to be able to interface with the relevant Public Transport Finance Department/Office/Division, the interface will be dependent on the Financial System to be used~~ or fare products bought through online channels.

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4.3. Customer Relationship Management System (CRMS)

4.3.1. Passenger Data will be maintained by the L4 FMC and will be accessible by the Contractor.

4.3.2. The L4 FMC will integrate a Call Center that will be a main point of contact with passengers for the whole BRT System.

4.4. Bus Rapid Transit Website & Mobile Ticketing Service

4.4.1. Passengers will be able to add value to Fare Products or renew Fare Products through an Internet application service. An internet service will allow for the reload Fare Products on registered fare media only. This service will also be available in a user-friendly manner on smart phones via a mobile phone application.

4.5. Key Management System (KMS) Security

4.5.1. All keys will be managed in a Key Management System (KMS) realized by the Employer as a part of the L4 FMC. The KMS will be housed in a standalone sub-system located in a physically secured area of the OCC.

4.5.2. In order to secure revenue, all transaction data will be signed and encrypted. The L4 FMC will provide for a KMS which is responsible for the generation, maintenance and secured storage of all cryptographic keys, system key materials and security variables utilized in the Fare System (EFC). The KMS system will manage keys and certificates from its birth to death/expiry.

4.6. Reporting & Analysis

4.6.1. The L4 FMC will offer several reporting functions to the Employer by selecting the data collected from the different L3 FMC.

5. Level 3 Fare Management Center (FMC)

5.1. Introduction

5.1.1. L3 FMC represent the servers and software to provide management and oversight of the Fare System that will make possible each ~~Public Transport Operator~~line deals separately with its ~~Fare System~~fare system duties by collecting information about the use of fare media and fare products, monitoring the status of the Fare System components and ensuring Fare System equipment is automatically updated with the latest configuration and rules to be applied.

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5.1.2. The L3 FMC to be provided by the Contractor must be designed to support a single public transport operator as a stand-alone multi-client solution, independent from any superordinate L4 FMC hardware which can be located at a different place.

~~5.1.1. The L3 FMC will provide each Public Transport Operator monitoring and control of their assigned field equipment. Additionally, the different instances of the L3 FMC (typically one per Public Transport Operator) will provide fare management to the Public Transport Operators (PTOs), enabling them to determine independent fare strategies, criteria definitions and business rules.~~

5.1.3. The L3 FMC to be supplied by the Contractor will be fully integrated with the L4 FMC to be supplied by a third party. In this regard, communications between the L4 FMC and the L3 FMC will be part of the Contractor scope of works.

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5.1.4. The communication system linking the Fare System levels must be a Gigabit as a minimum, preferably a 10 Gigabit Ethernet based communication system. This communication system provides connectivity along the entire network using optical fiber cable (OFC) backbone and local distribution to the ITS. Communication utilizing LTE and 4G must also be possible as an alternative system. As part of the bidders submission, Bidders (Potential Contractors) shall provide bandwidth calculations to support the proposed communication technology, considering the required effective bandwidth of the technology.

5.1.5. ~~Other Public Transport Operators will function and manage their equivalent L3 FMC systems similarly.~~ The L3 FMC systems will support the following main features to be provided by the Contractor:

Management & Control

a) Management & System Support;
b) Equipment Alarms and Events Monitoring;
c) Equipment Commanding;
d) Support of Action Lists ~~(Blacklist);~~and other lists such as hotlist, blacklists;
e) Flexibility to introduce new fare media and Products;

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Collection & Forwarding

f) Exchange of data with L2 & L1;
g) Settlement;
h) Exchange of data with L4;

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Reporting

~~5.1.2.~~5.1.6. The following diagram depicts the overall Fare System architecture and main functionalities available in Level 4 and Level 3:

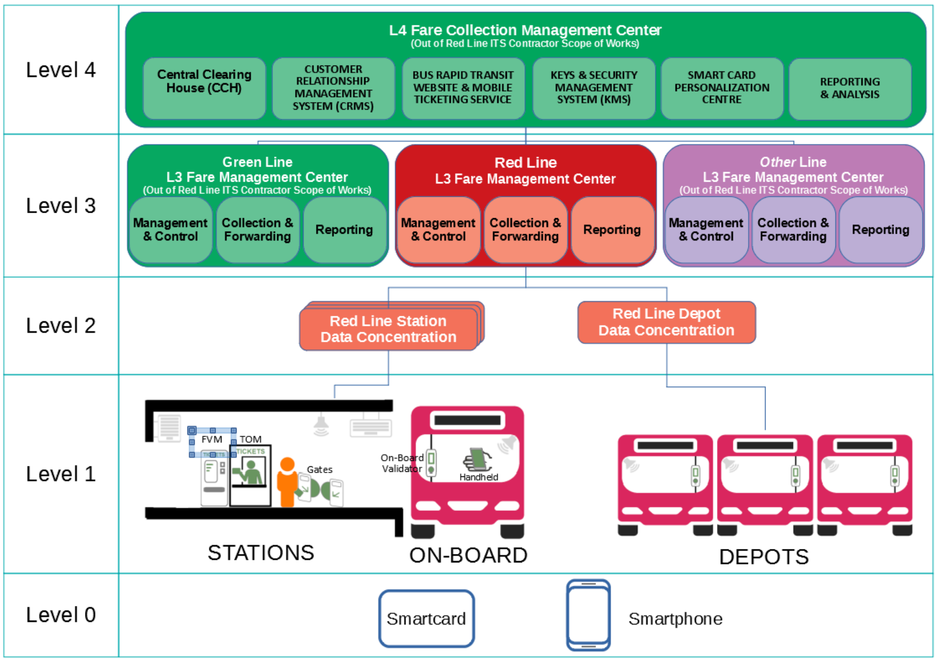
Level 4
L4 Fare Collection Management Center
(Out of Red Line ITS Contractor Scope of Works)
Central Clearing House (CCH)
CUSTOMER RELATIONSHIP MANAGEMENT SYSTEM (CRMS)
BUS RAPID TRANSIT WEBSITE & MOBILE TICKETING SERVICE
KEYS & SECURITY MANAGEMENT SYSTEM (KMS)
SMART CARD PERSONALIZATION CENTRE
REPORTING & ANALYSIS
Level 3
Green Line
L3 Fare Management Center
(Out of Red Line ITS Contractor Scope of Works)
Management & Control
Collection & Forwarding
Reporting
Red Line
L3 Fare Management Center
Management & Control
Collection & Forwarding
Reporting
Other Line
L3 Fare Management Center
(Out of Red Line ITS Contractor Scope of Works)
Management & Control
Collection & Forwarding
Reporting
Level 2
Red Line Station Data Concentration
Red Line Depot Data Concentration
Level 1
FVM
TOM
TICKETS
Gates
On-Board Validator
Handheld
STATIONS
ON-BOARD
DEPOTS
Level 0
Smartcard
Smartphone

Figure 4: Schematic of the Fare System architecture summarizing the main back office available functionalities.

~~5.1.3.~~5.1.7. The L3 FMC will include a Human Machine Interface (HMI) software, preferable accessible through a common Web Browser (e.g. Firefox), that will make possible, only to authorized users (System Operation Staff), accessing to the different FMC features.

~~5.1.4.~~5.1.8. By using the designated workstations, authorized users will at least be able to:

a) Analyse fare media use and revenue data;
b) Monitor and Control Fare System Equipment status;
c) Manage required action lists, including blacklists;
d) Supervise the collection, settlement and forwarding of data;
e) Review error messages; and
f) Access to the reporting tool.

5.2. Equipment Management

5.2.1. L3 FMC shall be responsible for individual device management. All Level L1 FMC to L2 FMC infrastructures must be registered in the L3 FMC system.

5.2.2. The L3 FMC will provide the necessary functionality to synchronize infrastructure elements with the L4 FMC.

5.2.3. At least the following infrastructure elements will be managed and synchronized with the L4 FMC:

a) Network Topology
b) Equipment
c) System Actors

5.2.4. The equipment management will make possible the introduction and removal of any L2 & L1 FMC components by the management of the following elements:

a) Fare System Equipment Inventory
b) Operational Parameters
c) Equipment Alarms configuration

5.2.5. A suitable text editor must be provided for processing text templates (e.g. for invoices, payment reminders and payment demand), to allow authorized users to modify the templates in order to meet changed reporting requirements.

5.2.6. A suitable graphic editor must be provided for the design and processing of the layouts of L1 FMC device layouts (e.g. to be able to change a fare vending machine screen's font size and type, shape design and size, screen background, Idle mode and screen saver, etc.).

5.3. Equipment Alarms and Events Monitoring

5.3.1. The L3 FMC will exchange messages with all online Fare System devices in nearly real-time in order to enable monitoring the Fare System equipment by collecting status messages sent by online Fare System devices asynchronously as soon as a state change occurs, periodically or as response to a request from the FMC. Status messages will report information such as operational mode, component state, alarms, versions, financial state, and stock levels.

5.3.2. The L3 FMC infrastructure will record the status of all equipment in the Fare System. Equipment with problems will be listed in the corresponding workstation, like the maintenance operation workstation, for attention of the maintenance officer who receives the report who must be able to contact the station immediately and repair the problem, within the time required in accordance with service levels KPIs.

5.3.3. Authorized users will be able to define groups of devices and errors (e.g. malfunction of fare vending machine) and assign actions to them to initialize system maintenance support automatically by:

a) Generating SMSs; and
b) Generating e-mails.

5.3.4. Filtering and grouping of the monitoring information received will enable displaying on the corresponding workstation the current monitoring status in at least three different levels:

a) By line: displaying the overall status of each line and the overall status of each location (station, depot, vehicle or other) with Fare System equipment installed;

b) By location or vehicle: displaying the overall location status and the overall status of each Fare System device in the selected location or vehicle.

c) By type of Equipment: displaying the overall and detailed status of the different Fare System devices.

d) By Fare System Device: displaying the status of the different components within the Fare System Device selected.

5.4. Equipment Commanding

5.4.1. The L3 FMC will exchange messages with all online Fare System devices in nearly real-time in order to make possible to remotely send command messages to online Fare System devices to request a change in their operational mode or apply an action on any of their internal components.

5.4.2. An authorized workstation user will be enabled to execute specific actions on the Fare System devices or modify its behavior or state. At least the following Commands will be available:

a) Equipment Commands: will be sent to a single device or a group of devices to change their operational mode or the status of an internal component.

b) Station Commands: will set all devices of a station into special station modes (e.g. entry/exit override, station closed or emergency mode).

5.5. Support of Action Lists (Blacklist)

5.5.1. Whitelists including fare media serial numbers to be accepted by the Fare System, Blacklists including fare media, Fare Product and SAM to be rejected by the Fare System equipment, and any other necessary Action List (like the required to automatically update, load or top-up specific fare media) will be integrated with the L4 FMC and subsequently delivered to the Fare System equipment for their action.

5.5.2. Equipment user and Action Lists, including Blacklists and any other list issued by the L4 FMC, will be incrementally imported (at least once per 10 minutes) and distributed to the Fare System equipment. Fare System Equipment will always have access to the most up-to-date version of the blacklist.

5.6. Flexibility to introduce new fare media and Products

5.6.1. The tariffs and prices must be defined in cooperation with all stakeholders and be implemented by the L4 FMC. The current definitions provided must not limit the scope of the Fare System to accommodate future tariff and price decisions.

5.6.2. The L3 FMC will provide the necessary functionality to visualize and manage accordingly the fare elements published by the L4 FMC.

5.7. Exchange of Data with L2 & L1

5.7.1. Exchange of data required by the L4 FMC from all Fare System equipment and preparation of this data will be performed through the L3 FMC.

5.7.2. The Data Collection from L2 & L1 Fare System equipment will ensure the real time reception of data, including at least the following two main types of information:

a) Collection of transactional and statistical information

b) Monitoring and remote control of Fare System devices

5.7.3. Once transaction data is collected from L2 & L1 Fare System equipment, it will be promptly loaded in the corresponding database, making it available to authorized L3 FMC users, reporting tools and other stakeholders through the required interfaces.

5.7.4. The L3 FMC Contractor shall implement the following control and reconciliation functions:

a) 100% of shipped fare media data is uploaded to Level 3 infrastructure; and

b) Provide exception reporting in case mismatches and or other anomalies.

5.8. Settlement

5.8.1. The L3 FMC will attend to the validation and clearing of all transactions, reconciling all fare media and Fare Products sales.

5.8.2. Daily settlement of fare media and Fare Product Sales will be made available to the L4 FMC.

5.8.3. The L3 FMC system infrastructure must perform fraud detection to prevent and detect fraud in the Fare System by validating transactions according to rules specifically targeted to detect insider and outsider fraud scenarios.

5.8.4. The L3 FMC system must have data-integrity management processes in place with built in process control, internal control and reconciliation functions that will process only authentic transactions. This data-integrity system will:

Accept transactions from registered and approved mobile money providers;

Approve transactions from registered and approved Level 2 infrastructure devices only;

Approve transactions from registered and approved Level 1 infrastructure devices only;

Received transaction completeness checks by sequence numbers checks and stored value balance versus transaction amounts, for example;

Have a functionality for documented clean-up of old and irreparable incomplete trip data; and

Allow for the reconciliation of sales with collected cash and sales through load agents;

Provide exception reporting in case of mismatches and/or other anomalies;

In the event of failed communication is detected. The party initiating the communication is responsible for – and able and equipped to – repair in case of failed communication;

All transactions received in a processing cycle must be validated and cleared not later than during the next processing cycle;

All transactions which are cleared in a certain processing cycle, must be settled on the same day if the clearing processing cycle is finished on a business day, or the earliest next business day for processing cycles not finished on a business day;

5.8.5. Sales accounting will cover both material and financial data for each Point of Sale devise. The financial accounting process must be able to provide separate figures for the various different forms of payment (e.g. cash, electronic payments).

5.8.6. An authorized user must be able to view the sales accounting data of certain individual Point of Sale devices or sellers/re-sellers at any time.

5.8.7. The debit entries from deliveries and sales must be balanced against the credit entries from takings that have been paid in and from returned smart cards. Any differences between the debit and credit entries must be reported as open items. Open items will be reported to the L4 FMC CCH for closure or collection.

5.9. Exchange of Data with L4

5.9.1. All parameters necessary for the operation, including but not limited to fare data (layout, prices, discounts, devices registered, etc.), will be automatically imported from the L4 FMC and automatically pre-processed and distributed to all Level 1 components of the Fare System. The proposed interface must a allow for repeated imports of fare data.

5.9.2. Transactional information (use of fare media) will be stored and transmitted to the L4 FMC using atomic structures, denominated in this document as Transaction Data Records. Transaction Data Records generated by the L3 FMC will include at least the following information and features:

All records will have the necessary information for identifying the FMC and equipment that generated it.

Universal sequential numbers to enable the control of the records generated and the detection of the missing records.

Message body containing specific information about the event being reported.

A signature to verify data integrity and authentication of the source.

Compression to optimize the size required for its storage and transmission.

Encryption to protect the content.

5.9.3. List information will be automatically imported from the L4 FMC and distributed to all Level 1 components of the Fare System within 10 minutes after being availabe at the L4 FMC.

5.9.4. The L3 FMC will include a functionality for exchanging data in degraded mode, normally caused by communication failures. In this case, the system will allow authorized users to export data from an external drive to exchange transaction data. In order to maintain security in this way of transmission, data stored on external drive will include the corresponding encryption and digital signatures that will ensure the origin of the data.

5.10. Reporting

5.10.1. Reporting comprises of internal reporting as well as external reporting to the Employer and any operators of the BRT services.

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5.10.2. Reporting to the Employer must cover at least reporting on travel, sales and revenue, service and quality levels, as well as control and audit information on the overall service- and quality levels.

5.10.3. The Fare System management information system must provide, at least, but not limited to real time and periodic (daily, weekly, monthly and yearly) reports on the operation, availability, maintenance state of Level 1-3 infrastructures: passengers, fare media and Fare Products sales, Fare Products usage, and revenue;

5.10.4. Fare System reports will be generated in less than 1 minute. Even though it is recognized that Pre-generated reports may be necessary to achieve compliance with this requirement, as pre-generated reports will not include the most recent information available in the system, any pre-generated report will be subject to the Employer's approval.

5.10.5. The L3 FMC must:

Generate performance reports of the Fare System Levels 1-3 infrastructures, reporting on KPIs and integration of these reports with the KPI Monitoring systems;

Send status reports on equipment at Stations to the maintenance workshop computer for repairs and/or preventive maintenance;

Send messages to the L4 FMC for fleet management purposes. The L3 FMC system must have a parameter which triggers an alarm at a station if it is detected that the number of passengers validated is higher or lower than this parameter in an interval of time, which can be assigned parameters in accordance with the indications given by the Employer for this purpose, such that, when it detects abnormal demand at a Station and feeder buses, a message will immediately be sent to the L4 FMC system for scheduling and controlling.

5.10.6. Besides the known reporting requirements, the system must furthermore provide flexible reporting functions to create and process reports on new requirements. The reporting functionalities must allow reports customized by each client with its client's data

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5.10.7. Authorized users will be able to define groups of devices and errors (e.g. malfunction of ~~FVMs~~fare vending machines) and assign actions to them to initialize system maintenance support automatically by:

a) Generating ~~SMSes~~SMSs; and

b) Generating e-mails.

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5.11. L3 FMC Non-Functional Requirements

5.11.1. The L3 FMC must take a contingency factor of two (2) or more into account.

5.11.2. For purposes of clarity a contingency factor 2 (two) means:

a) In the case of recovery after delays, the system can process 1 (one) additional calendar day's transaction load per day; or

b) Twice the daily transaction load will at most have a utilization of 100% of total capacity.

5.11.3. L3 FMC infrastructure outages must have no severe impact on the availability and functionality of L 1-3 FMC infrastructure devices.

5.11.4. L3 FMC infrastructure has an overall uptime requirement of 99.5%. For components that need to function on an online basis or near-online basis (such as lists) the uptime requirement is 99.999% during a one-year perikod.

5.11.5. Data must stay available online if needed for operational, audit or compliancy purposes. Older data must be archived and stored in a secure environment if needed for operational, audit and compliancy reasons. Archived data must be restored for online access within twelve (12) hours from the restoration requirement event.

5.11.6. The daily back-ups must be stored in a secure secondary location at a distance that guarantees availability in case of a disaster of any kind on the primary location;

5.11.7. A fully functional second server (disaster) system must be provided as a 'warm' standby solution which will be installed at a separate site. The Contractor must deliver all hardware components needed (e.g. server, router, cabling, UPS, software, communication) and ensure the functionality of both the production system and the Disaster Recovery System.

5.11.8. As a minimum the following disaster and backup functionalities must be included:

a) Disaster server in warm standby;

b) Data synchronization every hour;

c) Manually switch to implement failover; and

d) All connections will be re-routed automatically and are available without rebooting affected devices.

5.11.9. All servers must synchronize their clocks cyclically with the L4 FMC.

5.11.10. The L3 FMC will be equipped with the necessary network equipment and peripherals to establish a Virtual Private Network (VPN) with the L4 FMC.

5.11.11. Back-up processes guaranteeing the availability of back-ups will be defined and provided to the Employer. Proven continuity of services after the restoration of a back-up will be demonstrated.

5.11.12. Disaster recovery processes that describe roles, responsibilities, procedures, etc., to be used in case of failover to secondary disaster recovery facilities, will be provided by the Contractor.

5.11.13. In case of a major disaster (e.g. flooding, earthquake, fire) in the L 3 FMC or OCC, contingency must guarantee that services are restored within forty-eight (48) hours. During this time of system non-availability, provisional settlement continues based on historical average settlement values.

5.11.14. Failure of individual components or services (e.g. power supply and cooling) must not lead to L3 FMC non-availability. Redundancy must be built in wherever necessary.

5.11.15. Recovery and restart mechanisms and processes will ensure resumption or continuity of services without data loss.

5.11.16. Redundancy and recovery and restart mechanisms will be tested after every major system upgrade and at least once per year.

5.11.17. By architecture and design the system must be scalable, i.e. increase of the transaction load, increase of the number of users and buses and additional use for non-public transport services may lead to the commissioning of additional processing, storage, or network capacity, but must not lead to changes in system architecture or design and must not require the redesign or the replacement of applications.

6. Level 2 Fare System Equipment

6.1. Introduction

6.1.1. The communication network within the Fare System forms the backbone that interconnects all the elements of the Fare System. This network links the Level 1 devices, such as Fare Vending Machines and Automatic Gates, within a station and with the upper levels: L3 FMC and L4 FMC.

6.1.2. The purpose of the communication network is to ensure consistent and reliable connectivity for all ITS elements, including the Fare System equipment along different locations.

6.1.3. For further information about the ITS Communication Network requirements, please refer to the following separate document: 6.1.4.ITS.Schedule A_Goods.CommunicationsNetwork.

6.1.4. Additionally to the communication network equipment, Station/Depot Computers (SDC) are considered part of the Level 2 in the Fare System Architecture.

6.1.5. The Station/Depot Computer will allow Contractor's personnel to monitor and control the Fare System L1 Equipment at stationary location (typically BRT stations and Depots).

6.1.6. For this purpose, at least 1 (one) Station/Depot Computer may be provided per stationary location.

6.1.7. Optionally, depending on the solution of the Contractor, the Station/Depot Computer (SDC) may additionally collect local information at stations and/or depots from Fare System Equipment, consolidating and forwarding the data to the L3 FMC. However, other alternatives may be accepted as long as SDC is compliant with the requirements described in the following section.

6.2. Station/Depot Computer (SDC)

6.2.1. The SDC will enable at stationary locations (like stations, bus depots and others) viewing the current state and settings and changing the operational state of Fare System L1 devices. For example, it will be possible viewing the setting and changing the setting of the direction of bi-directional gates, and in case of insufficient battery power, the operator at the station will be alerted of this condition.

6.2.2. Emergency related functions must be provided through direct control of the automated gates (without depending on further L2 Fare System infrastructure). In addition it will be possible to set up a station in emergency mode from the SDC, the main consequence of this action will be opening all the station automated gates.

6.2.3. SDC will generate sales, cash reconciliation and validation reports related with the location associated to the SDC.

6.2.4. Network interruptions must prompt/result the automatic re-routing of network traffic without any data loss. L1 or L2 infrastructures service interruptions must lead to automated reactions and must occur without any data loss;

6.2.5. L1 Fare System equipment must be capable of functioning independently of L2 Fare System infrastructure for at least seven (7) =calendar days.

6.2.6. Similarly Fare System L2 and L3 equipment will be able of functioning independently without hampering Fare System operations.

6.2.7. In case the SDC acts as a collecting and forwarding hub, the following will apply:

The SDC will have enough capacity to guarantee that all daily and or periodical data uploads and downloads and additional processing is completed within the same cycle of at most 24 hours;

SDC will have an uptime requirement of 99.5% or better;

SDC will take a contingency factor of two (2) or more into account. For purposes of clarity a contingency factor 2 (two) means:

a) In the case of recovery after delays, the system can process 1 (one) additional calendar day's transaction load per day; or

b) Twice the daily transaction load will at most have a utilization of 100% of total capacity.

Each SDC will have built-in contingency, such as redundancy to ensure service continuity in case of system or system component outages and facilities' access or availability issues.

6.2.8. By architecture and design the L2 FMC system must be scalable, i.e. increase of the transaction load, increase of the number of users and buses and additional use for non-public transport services may lead to the commissioning of additional processing, storage, or network capacity, but must not lead to changes in system architecture or design and must not require the redesign or the replacement of applications.

6.2.9. The provision of the SDC in the associated locations will include all necessary peripherals (i.e. monitor, keyboard/mouse, workstation, etc.) to make possible to the corresponding Contractor's operational personnel interacting with the functionalities provided by the SDC.

7. Level 1 Fare System Equipment

7.1. Introduction

7.1.1. The following Level 1 Fare System Equipment will be supplied within the Contractor scope of works:

a) Station Automatic Gates;

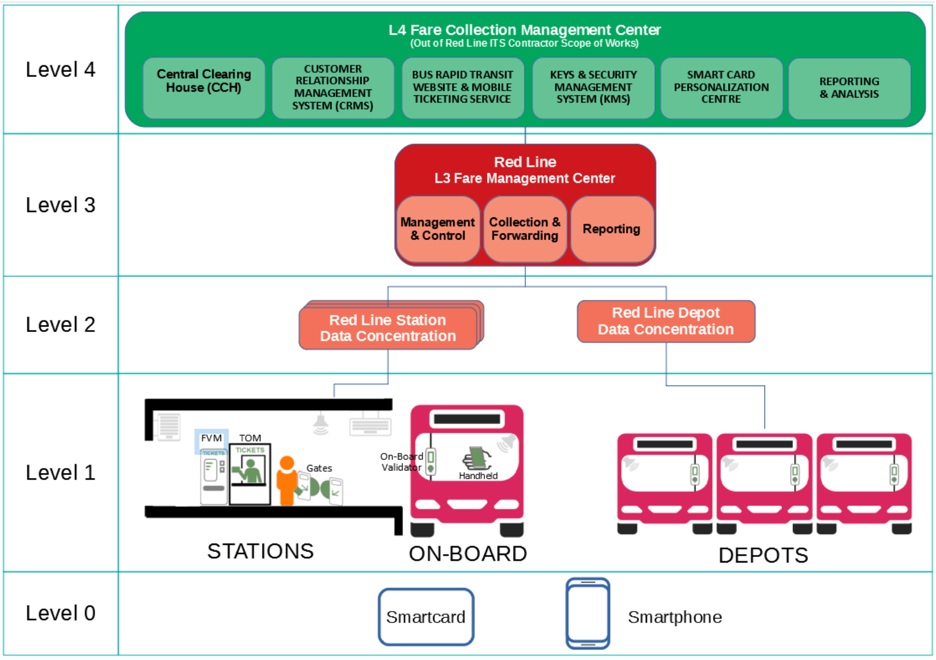
b) On-Board Validators;

c) Ticket Offices Machine (TOM);

d) Fare Vending Machines (FVM); and

e) Handheld Machines (HHM) with combined functionalities (vending, inspection and validation);

7.1.2. The following diagram illustrates the Fare System Level 1 Equipment and its relationship with upper levels :


Level 4
L4 Fare Collection Management Center
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Red Line Station Data Concentration
Red Line Depot Data Concentration
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FVM
TOM
TICKETS
Gates
On-Board Validator
Handheld
STATIONS
ON-BOARD
DEPOTS
Level 0
Smartcard
Smartphone

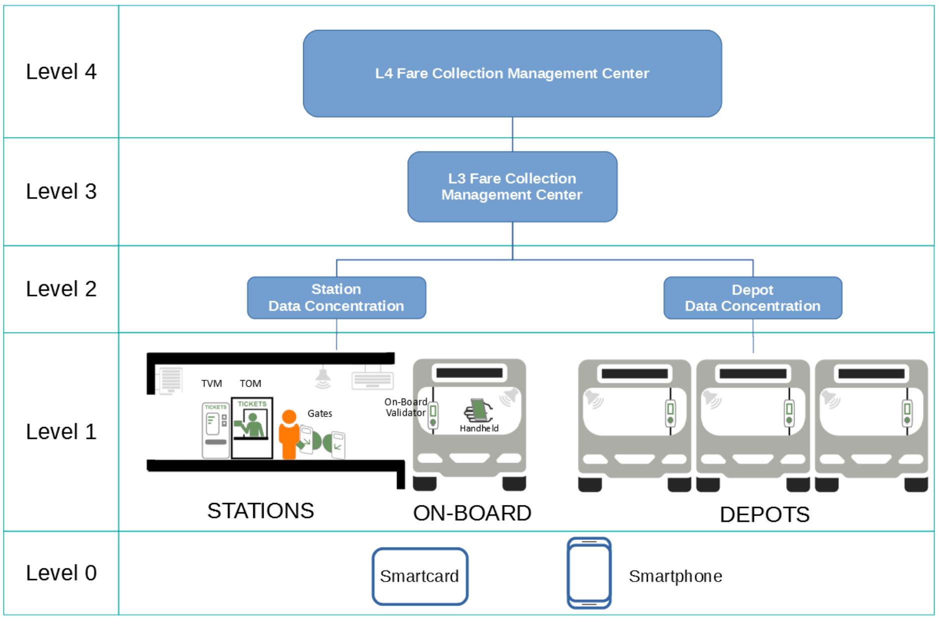


Figure 5: Schematic of the Fare System Architecture.

7.2. Fare System L1 General Requirements

7.2.1. Information visually presented to passengers will be displayed using the following languages:

a) Urdu; and

b) English.

7.2.2. Fare System Level 1 Equipment will be capable to accept 2D barcode fare media.

7.2.3. Fare System Level 1 Equipment must be capable to accept ISO 14443 both type A and type B fare media. Compliance of Level 1 Infrastructure devices with ISO 14443 standards shall be tested using the ISO 10373-6 framework.

7.2.4. Fare System Level 1 Equipment must be EMV L1 certified.

7.2.5. Fare System Level 1 Equipment will have a blacklist capability of at least two hundred thousand (200,000) fare media (unique identification numbers of fare media/Applications).

7.2.6. Fare System Level 1 Equipment will be fitted with a SAM that secures symmetric keys, and/or private keys or other recommended security system compliant with EMV or similar and all operations should establish the authenticity of fare media. For this purpose Fare System Level 1 CSC reader/encoder will be fitted with at least 2 SAM slots.

7.2.7. Design, resistance and installation of Fare System Level 1 equipment housing will prevent unauthorized access to all internal components. The housing will be equipped with a locking mechanism to prevent tampering.

7.2.8. Fare System Level 1 Equipment will communicate with the associated L2 SDC (if required) and L3 FMC, through the corresponding Fare System L2 infrastructure, to interchange all necessary information (including status monitoring events, commands, transaction data and configuration parameters).

7.2.9. Fare System Level 1 and Level 2 Equipment at stationary locations will be connected to the Local Area Network (LAN) through an Ethernet 100/1000 interface.

7.2.10. Fare System Level 1 Equipment installed at On-Board locations will be connected to the BRT Vehicle Local Area Network through an Ethernet 100 or 100/1000 interface.

7.2.11. The Contractor will provide a solution that ensures secured transactions even when Fare System Level 1 Equipment is offline to the upper levels (i.e. network communications out of service), all validation Level 1 Equipment must be able to successfully execute and complete offline transactions and have sufficient offline transaction storage capability for these transactions for seven (7) days of offline activity. When the connection is re-established, the Contractor shall ensure that transactions are promptly transmitted to upper levels automatically.

7.2.12. In the case of a breakdown of the communications it will be possible to load/unload all relevant data (e.g. transaction data, configuration and software/firmware updates) via USB pen drive.

7.2.13. No transaction data (e.g. fare media/product usage, status events) to be recorded will be overwritten before reception in L2 SDC or L3 FMC is confirmed. If no further transaction data can be stored the Fare System L1 Equipment, this situation will be reported to L2 SDC and L3 FMC, and the equipment will go into Maintenance/Out of Service mode.

7.2.14. Fare System Level 1 Equipment will synchronize its clock during initialization and subsequently at least once per hour.

7.2.15. The Contractor will perform upgrades of the network infrastructure and other utilities in the Stations or install new utility infrastructures if required to meet the requirements stipulated in the Contractor Agreement and its Schedules. This includes communication infrastructure between Level 1 and 2, Level 2 and 3, and between Level 3 and other systems.

7.2.16. Fare System Level 1 and Level 2 Equipment at stationary locations (including at least stations and bus depots) will continue operational for the duration of at least ten (10) minutes after a power supply failure.

7.2.17. Power supply failure will not lead to any kind of data loss. In this regard, power supply failures during CSC processing will not lead to errors on the CSC or to the destruction of any data associated to the CSC.

7.2.18. Fare System Level 1 Equipment will have an anti-collision mechanism. When the antenna on the equipment detects the presence of various CSCs, it should inform the passenger, so that the situation can be corrected by presenting only one CSC, or have a mechanism to avoid accidental reading or writing so that other cards may enter or leave the field of the antenna without disturbing the transaction which is being performed.

7.2.19. All fare media and subcomponents of the Fare System equipment and software must be standard devices which are produced with equivalent features by at least two different suppliers.

7.2.20. Complete specifications for the procurement and initialization of fare media shall be submitted to the Employer, enabling the Employer to procure batches of fare media subsequent to the initial delivery by the Contractor.

7.3. Automatic Gate

7.3.1. The Fare System in BRT stations will be "closed" system that will require checking of fare media at station Automatic Gates (also called "Gates") to entry and exit.

7.3.2. In the transit zone between the paid and the unpaid station areas entry/exit Gates will be installed by the Contractor.

7.3.3. Automatic gates will be part of the access control barriers. The following items state the main objectives of the Automatic Gates:

a) Differentiating between paid areas at Stations from unpaid areas;

b) Preventing unauthorized passage between paid and free areas;

c) Collecting of the fare by reading and writing, if required, the fare media used for passenger access;

d) Recording information about the access of passengers to and from the paid area of stations; and

e) Blocking fare media and execute remote actions following the Action Lists received as required.

7.3.4. The gate processing speed in conjunction with the number of gates accommodated and line layout shall eliminate or minimize queuing of passengers.

7.3.5. Gate arrays will be the normal-means of controlling entry to and exit from the paid areas. Control should be by means of actuating a physical barrier on recognition of a valid fare media by the gate.

7.3.6. Gates will be installed mainly in the concourse area for processing exit and entry passenger flows.

7.3.7. Wherever the passageway is wider than the gates installed, the Contractor will close the passageway with barrier constructed with materials matching the gate's construction.

7.3.8. The Gates shall be capable of operating either normally open or normally closed.

7.3.9. The following types of Automatic Gates are distinguished:

a) **Entry gates:** Automatic gates, typically only on the left-hand side of the access control barrier, only permitting entry to the paid area, unless flush mode is active. Minimum passage width of 55 centimetres;

b) **Exit gates**: Automatic Gates, typically only on the right-hand side of the access control barrier, only permitting exit from the paid area. Minimum passage width of 55 centimetres;

c) **Bi-directional gates:** Automatic Gates, typically found in the middle of the access control barrier, either permitting entry and exit from both sides, or configured as permitting entry or exit only. Minimum passage width of 55 centimetres; and

d) **Wide gates:** Bi-directional gates, one per access control barrier, with a wide passage of at least 90 centimetres. Each access control barrier will have at least one Wide Automatic Gate

7.3.10. Bi-directional gates will make possible to be configured to function in the following normal modes:

a) **Entry mode:** For cases in which check-in validation for passage from unpaid to paid area is required, and passage from paid to unpaid is prohibited;

b) **Exit mode:** For cases in which check-in validation is switched off, passage from unpaid to paid area is prohibited, and check-out validation for passage from paid to unpaid is enabled; and

c) **Bi-directional mode**: For cases in which check-in validation is required for passage from unpaid to paid area, and check-out validation for passage from paid to unpaid is enabled.

7.3.11. Each Automatic Gate will be able to be configured to function in at least the following exception modes:

a) **Flush mode**: In which only passage from Paid to Unpaid area is enabled without validation to flush out passengers from a station;

b) **Limited service or energy-saving mode**: The mode in which equipment continues to provide services, but with one or more of the functions out of service in order to save energy, other than validation, recording of information, and release of an Automatic Gate for use. This type of service will be applied when there are problems of electricity supply or when contingency procedures are activated;

c) **Free mode:** This mode must release access in both directions in the event of a failure of the power supply, and a failure of the backup battery, or when the data consolidation unit orders it; and

d) **Out of service:** This mode must block movement in both directions, along with the slot for reading magnetic fare media.

7.3.12. The Fare System must continuously record the mode of operation in use for each Automatic Gate in the BRT system.

7.3.13. The proposed Automatic Gate shall be formed by a fixed housing and a moving “retractable flap” obstacle that will enable entry or exit to passengers with the appropriate Fare Product. Turnstiles are not permitted.

7.3.14. The mechanism of the Automatic Gate will have a silent operation, and a shock-absorbing mechanism for strong blows, which will allow an Automatic Gate to return smoothly to normal operating position.

7.3.15. The rigidity of the Automatic Gate will be guaranteed by the use of a principal structure, and an appropriate system for anchoring. The structure will be anchored to the floor at a minimum of four points.

7.3.16. The external design will be compatible with the most updated version of the Americans with Disabilities Act (ADA). Compliance with alternative similar standard will be subject to the Employer’s approval.

7.3.17. Automatic Gates will include internally a universal service power socket and a circuit breaker before the equipment connection point.

7.3.18. Each fare gate will be equipped with one fare media validator (reader/encoder) on the side of passage (on the two sides for bidirectional and wide gates), for each type of media to be used. The CSC fare media reader/encoder will be EMV L1 and L2 certified for future upgrade purposes;

7.3.19. There must be clear visual and audio signaling to passengers indicating which Automatic Gates grant passage from the approaching area (both from unpaid and paid side);

7.3.20. On the two front vertical faces of the housing, there will be luminous pictograms (green/red) to indicate to passengers at least the status and direction of the service of the Automatic Gate: whether entry (e.g. arrow) or exit (e.g. X).

7.3.21. The velocity and design of the pictograms sill guarantee that passengers can identify the operational status of the barrier from ten (10) meters away, provided that there is a line of sight.

7.3.22. The location and orientation of the pictograms on the Automatic Gate will guarantee appropriate visualization by a passenger in transit, without affecting the speed of his/her access.

7.3.23. Pictograms on the Automatic Gates will be protected by anti-vandalism transparent material resistant to scratching, dust, water, abrasion, graffiti, and other damaging agents.

7.3.24. The Automatic Gates will be fitted with a user information display on the side of passage (on the two sides for bidirectional and wide gates), located and oriented to provide appropriate visualization to passengers, capable to show by using different colors and symbols at least:

a) The result of the fare media validation.
b) Fare collected.
c) Remaining balance of the Fare Product selected for the trip.
d) State of the transaction.
e) Instructions to solve issues.

7.3.25. The Automatic Gate user information display must be protected by an anti-vandal transparent material resistant to scratching, dust, water, operation, and other harmful agents that may make themselves present during the operation of the System.

Technical requirements for the Gate passenger information display:

Automatic Gate passenger Information Display	
Aspect	**Minimum requirement**
Display size/resolution	Size: Six (6) inch or larger. Resolution: six hundred and forty and four hundred and eighty (640 x 480) Brightness: six hundred (600) cd/m2 Contrast Ratio: four hundred to one (400:1) View Angle: one hundred and twenty degrees (120º) (vertical and horizontal) Display Color: sixteen point two (16.2) M
Operating Temperature	Minus ten degrees Celsius to fifty degrees Celsius (-10ºC to 55ºC)
Storage Temperature	Minus twenty degrees Celsius to sixty degrees Celsius (-20ºC to 60ºC)

Table 2: Technical requirements of the Automatic Gate passenger Information Display

7.3.1. Detection and safe passenger passage should be assured along the entire length and height of the gate by an adequate number of sensors in order to:

a) Prevent injury of adult passengers, small kids or pregnant woman ;

b) Prevent fraudulent use of the gate (e.g. gate tailing);

c) Provide accurate passenger counting data

7.3.2. The fare gate shall be able to effectively communicate using Ethernet communication with the Fare System L2 infrastructure.

7.3.3. The fare gate shall be capable of working in an off- line mode in case of communication network failure;

7.3.4. Validation must always occur on the right-hand-side of the passage.

7.3.5. Unintentional transactions (e.g. multiple use of one ticket) shall be prevented. Automatic Gates will have an anti-pass back mechanism to avoid double validation of fare media within a certain period, preventing passengers to check-in twice or more without passing.

7.3.6. Automatic Gates will be able to accept a second fare media after the previous passenger has checked in, but before he/she has been passed through the Automatic Gate.

7.3.7. Automatic Gates will be able to grant passage during a configurable amount of time (initially fifteen (15) seconds). This is the maximum duration between a validation by an Automatic Gate, and the completion of the passage through the gate by the passenger having obtained a right-to-travel. After the grant time, passage is only allowed with a new right-to-travel, provided that the anti-pass back period has passed.

7.3.8. The location of the fare media readers and the rest of the Gate components will be designed in such a way that promotes fast passenger flows, ensuring that passengers are able to proceed through the gate, without stopping.

7.3.9. To decrease the check-in times via bar-code tickets, there should be a glass surface in a defined optimal reading distance to the bar-code reader.

7.3.10. The passenger throughput capacity of the Automatic Gates will be at least forty (40) passengers using CSC. The effective throughput capacity for passengers using Barcode Fare media will be at least twenty (20) passengers per minute.

7.3.11. The required performance during validation of any fare media (including the deduction process and storage of the modified data on the CSC) will be below 350 milliseconds for both Check-in and Check-out transactions.

7.3.12. If a fare media reader/encoder has to be replaced, identity information parameters (station ID, Gate ID, etc.) will be retrieved and updated automatically without any manual intervention.

7.3.13. Once an Automatic Gate authorizes a passenger for entry or exit, it will permit passage in the authorized direction, informing with visual and audio feedback to the passenger.

7.3.14. If there is an attempt to open an Automatic Gate without previously having received an authorization, the automatic gate will impede Passage in both directions, and must issue an anti-fraud alarm.

7.3.15. In case of emergency, passengers will be able to get through the Automatic Gates even if they remain in closed mode and no fare media is presented. This situation will be reported accordingly to L2 SDC and L3 FMC through the corresponding event.

7.4. On-Board Validator

7.4.1. Each BRT vehicle utilized for direct service routes will be equipped with two (2) Validators per curb-side rear door and one (1) Validator per curb-side front door.

7.4.2. The following items describe main objectives of the On-Board Validator:

a) Collecting of the fare by reading and writing, as required, the fare media used for passenger access;

b) Indicating to the driver or conductor of the bus whether passengers are authorized to enter the bus;

c) Recording information about the boarding and alighting of passengers; and

d) Blocking fare media and execute remote actions following the Action Lists received as required.

7.4.3. The Validators must have an ergonomic design, free of rough surfaces, sharp angles, or points, or any element which may cause damage to passengers.

7.4.4. On-Board Validators will be equipped with one reader/encoder for each type of media to be used, allowing to record Fare Products usage, controlling the access of passengers to the system and transmitting the information recorded to L3 FMC through a L2 SDC at Bus Depots if necessary. The CSC fare media reader/encoder will be EMV L1 certified for future upgrade purposes;

7.4.5. Audio feedback and luminous pictograms (green/red) will indicate the operational state of the device and the result of the validations to passengers.

7.4.6. The location and orientation of the pictograms on the Automatic Gate will guarantee appropriate visualization by a passenger in transit, without affecting the speed of his/her access.

7.4.7. The On-Board Validators will be fitted with a user information display, located and oriented to provide appropriate visualization to passengers, capable to show by using different colors and symbols at least:

a) The result of the fare media validation.

b) Fare collected.

c) Remaining balance of the Fare Product selected for the trip.

d) State of the transaction.

e) Instructions to solve issues.

7.4.8. The On-Board Validators user information display must be protected by an anti-vandal transparent material resistant to scratching, dust, water, operation, and other harmful agents that may make themselves present during the operation of the System.

Technical requirements for the On-Board Validator information display:

Automatic Gate passenger Information Display	
Aspect	**Minimum requirement**
Display size/resolution	Size: Three point five (3.5) inch or larger. Resolution: six hundred and forty and four hundred and eighty (640 x 480) Brightness: six hundred (600) cd/m2

	Contrast Ratio: four hundred to one (400:1) View Angle: one hundred and twenty degrees (120º) (vertical and horizontal) Display Color: sixteen point two (16.2) M
Operating Temperature	Minus ten degrees Celsius to fifty degrees Celsius (-10ºC to 55ºC)
Storage Temperature	Minus twenty degrees Celsius to sixty degrees Celsius (-20ºC to 60ºC)

Table 3: Technical requirements of the On-Board Validator passenger Information Display

7.4.9. The On-Board Validator shall be able to effectively communicate, through a standard M12 connector, via Ethernet communication with the On-Board Ethernet switch, to be present in the BRT Vehicles.

7.4.10. All Validators must have an anti-pass back mechanism to avoid double validation of fare media, preventing passengers to check-in twice or more times without noticing it.

7.4.11. Validators will be able to be configured to operate at least the in following modes:

a) **Normal mode:** the mode in which the equipment validates all presented fare media and debits stored value where required;

b) **Check-in only:** allowing only check-in validations**;**

c) **Bi-directional:** allowing check-in and check-out validations**;**

d) **Check-out only:** allowing only check-out validations;

e) **Free mode:** the validator will process all presented fare media, but will not perform a validation to deduct stored value; and

f) **Out-of-service:** the validator will not react to the presented fare media.

7.4.12. Validators will receive accurate position data from the bus AVL On-Board Unit at least every second. This way it will be possible for the On-Board Validators to reliably map the position of the current or next stop-point on a route.

7.4.13. Validators shall receive door opening and closing information from the AVL On-Board Unit to switch validators to out-of-service mode upon closing of the door, and to Normal mode upon opening of the door. This reconfiguration must take place within a second from start of door opening, and end of door closing. This behavior shall be managed by a parameter maintained at the L3 FMC.

7.4.14. The validation throughput capacity of validators must be sixty (60) passengers per minute or higher.

7.4.15. All Validators will connect with L2 SDC or L3 FMC through the wireless communications available in the BRT Vehicle (WiFi or 4G).

7.4.16. At a minimum, for non-urgent updates, On-Board Validators will establish connection with upper levels once the BRT vehicle is connected to the WiFi network in the Depot or staging area, however under normal conditions it is expected that On-Board Validators report the fare media usage (transaction data) to upper levels in nearly real-time by using the communications available on-board. Additionally, urgent updates will be performed during the operational day, before the BRT vehicle arrives to the Depot or staging area.

7.4.17. The user information screen will be located and oriented in such a way as to provide information to users on the balance of their stored value, the state of transaction and instructions to solve problems.

7.4.18. The screen must be protected by an vandal-protected transparent material resistant to scratching, dust, water, operation, and other harmful agents that may make themselves present during the operation of the system.

7.5. Ticket Office Machine (TOM)

7.5.1. Ticket Office Machines may be obtained from (an agent of) the Employer. It will directly connect to the L4 FMC for card personalization purposes.

7.5.2. At least one (1) Ticket Office Machines (TOM), to be supplied and installed by the Contractor in sales offices, will be present at BRT Stations and potentially could be installed at other stationary locations, to be operated manually by the Contractor’s personnel, denominated TOM Operators.

7.5.3. Depending on the Operator User ID profile rights, different configurable functions will be available on the main screen of the TVS. These operations displayed for each profile will be configurable (enabled/disabled) by the L3 FMC.

7.5.4. Ticket Office Machines will provide all fare media and Fare Product management features necessary for manually operated point of sales, including:

a) Fare Media and Fare Product sales;

b) Stored Valued top-up and renewal;

c) Delivery of fare media (including Staff fare media);

d) Recording and follow-up of complaints;

e) Recording and handling of passenger claims due to faults with the fare media;

f) Fare Media refund and replacement, transferring associated data from faulty fare media to a new one ;

g) Lost Media management;

h) Invalidation of fare media. Blocking fare media and execute remote actions following the Action Lists received as required;

i) Inspection of fare media and status enquiry;

j) Registration and De-Registration of fare media and associated account;

k) TOM operator shift management: including start of operator shift, end of operator shift suspend and resume shift and generation of summary sales reports;

l) Monitor and report visually to the operator the status of the local devices;

m) Fare Media stock management;

n) Print payment receipts (making possible to re-print the last printed receipt);

o) Cancel the last operation performed by the TOM;

p) Revenue management;

7.5.5. The following payment methods will be available:

a) Bank Notes

b) Coins

c) Bank Cards (Credit or Debit) and equivalent digital wallet available in the country (Apple Pay, Google Pay, Samsung Pay, etc.)

d) Mobile money provider

7.5.6. The Graphic User Interface (GUI) of the TOM will support two (user selectable) languages:

a) Urdu; and

b) English.

7.6. Fare Vending Machine (FVM)

7.6.1. At least two (2) automatic vending machines with fare media capabilities, denominated Fare Vending Machine (FVM) and to be supplied and installed by the Contractor, will be present at stationary locations (typically the concourse area of BRT Stations) easily accessible to passengers.

7.6.2. Fare Vending Machines (FVM) will provide all fare media and Fare Product management features necessary for automatic operated point of sales, including:

a) Fare Media and Fare Product sales;

b) Stored Value top-up and renewal;

c) Invalidation of fare media. Blocking fare media and execute remote actions following the Action Lists received as required;

d) Inspection of fare media and status enquiry;

e) Fare Media stock management;

f) Print payment receipts;

g) Revenue management.

7.6.3. The FVM will be designed as a multi-computer system with a central PC and decentralized microcontrollers to control and monitor the internal peripheral components (e.g. printing, display banknote handling, card processing components).

7.6.4. The external design will have an attractive compact shape (upright with a flat rear side), compatible with the most updated version of the Americans with Disabilities Act (ADA). Compliance with alternative similar standard will be subject to the Employer’s approval.

7.6.5. The rigidity of the Fare Vending Machine housing will be guaranteed by the use of a principal structure, and an appropriate system for anchoring. The structure will be anchored to the floor at a minimum of four points.

7.6.6. Fare Vending Machines will include internally a universal service power socket and a circuit breaker before the equipment connection point.

7.6.7. Bank note acceptors must feature an escrow to return the same cash introduced by the passenger upon cancellation of the transaction;

7.6.8. The banknote acceptor should be able to accept banknotes inserted all possible 4 ways in longitudinal direction.

7.6.9. Forged and foreign banknotes should be rejected and returned to the customer. The Contractor shall be liable for accepting counterfeit or foreign banknotes.

7.6.10. One reader/encoder for each type of media to be used, allowing to record Fare Products usage. The CSC fare media reader/encoder will be EMV L1 certified for future upgrade purposes;

7.6.11. The following payment methods will be available:

a) Bank Notes (exact price)

b) Bank Cards (Credit or Debit) and equivalent digital wallet available in the country (Apple Pay, Google Pay, Samsung Pay, etc.)

c) Mobile money provider

7.6.12. In order to accept bank card payment, each FVM will be supplied with an incorporated unattended EMV certified Contact & Contactless bank card payment terminal, including card reader and pin pad.

7.6.13. The Graphic User Interface (GUI) of the FVM will support two (user selectable) languages:

a) Urdu; and

b) English.

7.6.14. All successful fare transactions must be immediately reported to the L3 FMC (through the L2 SDC if necessary)

7.6.15. The FVM will have an active, fully graphic capable touch screen compliant with the following minimum technical requirements:

FVM passenger Information Display	
Aspect	**Minimum requirement**
Display size/resolution	Size: Fifteen (15) inch or larger. Resolution: One thousand two hundred and eighty x One thousand and twenty four (1280 x 1024) Brightness: eight hundred (800) cd/m2 Contrast Ratio: four hundred to one (400:1) View Angle: one hundred and twenty degrees (120º) (vertical and horizontal) Display Color: sixteen point two (16.2) M
Operating Temperature	Minus ten degrees Celsius to fifty degrees Celsius (-10ºC to 55ºC)
Storage Temperature	Minus twenty degrees Celsius to sixty degrees Celsius (-20ºC to 60ºC)

Table 4: Technical requirements of the FVM passenger Information display

7.6.16. The outer covering of the display will be resistant to impacts and scratching. This outer covering will be easy to replace.

7.6.17. The touch panel will not require manual recalibration.

7.6.18. The display will be mounted in such a way that readability is maximized, even in direct sunlight. For this purpose, automatic and manual adjustment of brightness and contrast will be implemented.

7.6.19. The Fare Vending Machine must feature one (1) or more secure cash vaults.

7.6.20. Removal of the cash vault without authorization must trigger an alarm and be reported to the L3 FMC central system.

7.6.21. All login attempts, successful or unsuccessful, will be recorded by the TOM and reported to the L3 FMC.

7.6.22. It must be possible to restock Fare Vending Machines with paper roll and fare media, as well as to replace the cash vaults, must within five (5) minutes.

7.7. Vending, Inspection and Validation Handheld Device (VIV)

7.7.1. The Vending, Inspection and Validation Handheld Device (VIV) will be portable devices used as a Vending, Validation or Inspection machine to be operated manually by the Contractor's personnel, denominated in this section VIV Operators (typically Inspectors or Conductors).

7.7.2. Access to the VIV functionalities will require successful login by introducing:

a) VIV Operator User ID

b) Personal Identification Number (PIN)

7.7.3. All login attempts, successful or unsuccessful, will be recorded by the VIV and reported to the L3 FMC.

7.7.4. Once login is successful, a new shift, identified with a unique serial number and associated with the corresponding VIV Operator User ID, will be started and the main operation GUI screen will be displayed.

7.7.5. Depending on the Operator User ID profile rights, different configurable functions will be available on VIV. These operations displayed for each profile will be configurable (enabled/disabled) by the L3 FMC.

7.7.6. VIV will be used to perform fare media/Product sales and reload manually operated by the Contractor's staff, e.g. at Station. It will be deployed in any other location where prompt respond to demand is required as per operational requirements.

7.7.7. Additionally, VIV will be able to carry out fare media/Product Validation as replacement of a Gate in case of breakdown or as support. Therefore the VIV software will support activating the validation functionality based on Station location and deployed Fares.

7.7.8. The following items describe main features of the Vending, Inspection and Validation Handheld Device (VIV):

a) Fare Media and Fare Product sales;
b) Stored Value top-up and renewal;
c) Collecting of the fare by reading and writing, as required, the fare media used for passenger access;
d) Indicating to the VIV operator whether passengers are authorized to enter the bus;
e) Recording information about the check-in and check-out of passengers; and
f) Blocking fare media and execute remote actions following the Action Lists received as required.
g) VIV operator shift management: including start of operator shift, end of operator shift suspend and resume shift and generation of summary sales reports;
h) Fare Media stock management;
i) Print payment receipts (making possible to re-print the last printed receipt);

j) Cancel the last operation performed by the VIV;
k) Revenue management;

7.7.9. The VIV must have a sales limit, limiting the amount of sales of fare media, stored value and products to be performed without further online authorization from the Level 3 FMC.

7.7.10. The VIV limits must be set and maintained by the Contractor and must be configurable per VIV.

7.7.11. The VIV must have a closing function. At the end of a shift, the operator must activate a closing function to enable printing a summary of the transactions performed and send all transactions to Fare System upper levels, ensuring it will be possible to carry out a cash reconciliation against the transactions reported.

7.7.12. VIV will generate transaction reports that will enable operators with an open shift to check the transactions performed and associated revenue.

7.7.13. The VIV will be a hand-held device being able to operate stand-alone for at least eight (8) consecutive hours while performing its duties.

7.7.14. VIV will be equipped with one reader/encoder for each type of media to be used, allowing to record Fare Products usage. The CSC fare media reader/encoder will be EMV L1 certified for future upgrade purposes;

7.7.15. At least one (1) docking station with LAN Ethernet connection capability will be provided with each VIV unit to facilitate power charging and reliable data communications.

7.7.16. The VIV will have the capability to connect via mobile 4G and WiFi secure connection to interchange regularly information (e.g. transactions and monitoring events) with the L3 FMC (depending on the Contractor solution, this communication could be performed through the L2 SDC).

7.7.17. All stations must be fitted with recharging facilities.

7.7.18. The VIV must be capable to validate fare media or Fare Product status within eight hundred (800) milliseconds.

7.7.19. The VIV must not weigh more than eight hundred (800) grams, excluding paper.

8. Level 0: Fare Media

8.1. Introduction

8.1.1. ~~7.2.1~~ The Contractor will ~~provide~~support and ~~issue at least~~sell smart cards obtained from (an agent of) the Employer, and sell single use tickets.

~~8.1.1.~~8.1.2. Employer may wish to introduce mobile emulation of smart cards, and all L1 devices must accept these as valid fare media~~ with the form factor Smart Cards. The Contractor is allowed to issue other form factors~~.

~~8.1.2.~~8.1.3. The Employer retains all Smart Card issuance and branding rights in relation to the smart cards.

~~8.1.3.~~8.1.4. At all Stations the fare sales offices and the FVMs shall be sufficiently stocked with fare media to ensure continued sale of fare media throughout the day~~;~~.

8.2. Specifications

~~8.2.1.~~ Contractor ~~must guarantee Smart Cards~~ will ~~remain functional for a period of at least five (5) years, from date of first sales to a passenger. This includes guarantees against delamination, breaking of the antenna weld,~~receive detailed interface specifications and ~~the like.~~

~~8.2.2. Fare Media - Functional Requirements~~

~~8.2.3. Smart cards must support or be associated with 1 Monetary Fare Product (stored value) and a minimum of two (2) Non-Monetary Fare Products.~~

~~8.2.4. CSC fare~~ media ~~will not be based on a proprietary solution and will be possible to get compatible fare media through at least 5 dealers to be appointed by the Contractor.~~

~~8.2.5. Main CSC Micro-processor technical requirements:~~

~~8.2.6. Minimum non-volatile memory 4kB;~~

~~8.2.7. Supporting algorithm Triple-DES and AES;~~

~~8.2.8. Unique serial number;~~

~~8.2.9. Anti-collision;~~

~~8.2.10. Flexible file system;~~

~~8.2.11. CSC fare media will be fully compliant with the following international standards:~~

~~8.2.12. ISO/IEC 14443 Type A or B;~~

~~8.2.13. Contactless protocol suite defined in ISO/IEC 14443-1/2/3 Type A or B. Remark: Testing of ISO compliancy according to ISO/IEC 10373-6;~~

~~8.2.14. ISO 14443-4 (T=CL);~~

~~8.2.15. CEN/ENV 1545 (Storage of information regarding public transports)~~

~~8.2.16. ISO/IEC 7816 1, 2, 3, 4 (smartcard interfaces and files)~~

~~8.2.17. Durability tested according to ISO 10373 or ANSI INCITS 322-2008;~~

~~8.2.18. NFC Type 4 Tag;~~

~~8.2.19. If the fare media application is based on a national or de facto industry standard, then the application must be a direct implementation of the national or industry standard, and not a proprietary implementation derived from the national or industry standard.~~

~~8.2.20. Performance requirements~~

~~8.2.21. The validation of a fare media (check-in or check-out) must be performed within three hundred fifty (350) milliseconds. This shall include terminal processing and communication time;~~

~~8.2.22. An Inspection transaction must be performed within eight hundred (800) milliseconds. This shall include terminal processing and communication time;~~

~~8.2.23. Fare Product sale and reload transaction must be performed within eight hundred (800) milliseconds. The sales of a single-journey fare card must be excluded from this requirement. fare media for account-based systems will also be excluded from this requirement;~~

~~8.2.24. CSC must function within the proximity of a reader component between zero (0) millimeter and seventy (70) millimeters.~~

~~8.2.25. Form factor requirements~~

~~8.2.26. The Smart Card is a fare media with ID-1 format according to ISO/IEC 7810. Testing of compliancy must be performed by the Contractor according to ISO/IEC 10373-1;~~

~~8.2.27.~~ 8.2.1. ~~All fare media are visually uniquely identifiable to the passenger and~~ layout specifications from the Employer~~. This means that a unique identification number must be printed, engraved, or embossed on the fare media;~~

9. CRYPTOGRAPHIC SERVICES AND SECURITY MANAGEMENT ASSOCIATED WITH THE FARE SYSTEM

9.1.1. The stakeholder responsible for the L4 FMC will provide the following cryptographic services:

a) Generation of PKI key-pairs and issuance of certificates;
b) Generation and distribution of certificate revocation lists;
c) Generation and distribution of symmetric keys;
d) Personalization and distribution of Secure Application/Access Modules (SAM); and
e) Management of certificates, keys and SAMs.

9.1.2. The Contractor must be responsible for the security management of L1-L3 Fare System equipment and software, comprising of:

a) Management of physical and logical access to the Fare System; and

b) Management of the usernames and passwords for the system.

9.1.3. An industry-standard IT security management or a proprietary or non-proprietary equivalent must be implemented to ensure the security of the IT management and information system. The security management approach must maintain the confidentiality, integrity and authenticity for each of the information elements in the Fare System that require confidentiality, integrity, and authenticity.

9.1.4. Access to IT system components and documentation must be limited to 'need-to-know' and 'need-to-process' only.

9.1.5. Access to the fare media issuer facilities (if any) and related systems must be limited to authorized personnel only;

9.1.6. Segregation of duties (e.g. 'create' and 'release' functions) must be implemented for high-impact system interaction (e.g. financial-, access control- or security-related);

9.1.7. High-impact system interaction must be logged and kept for audit purposes;

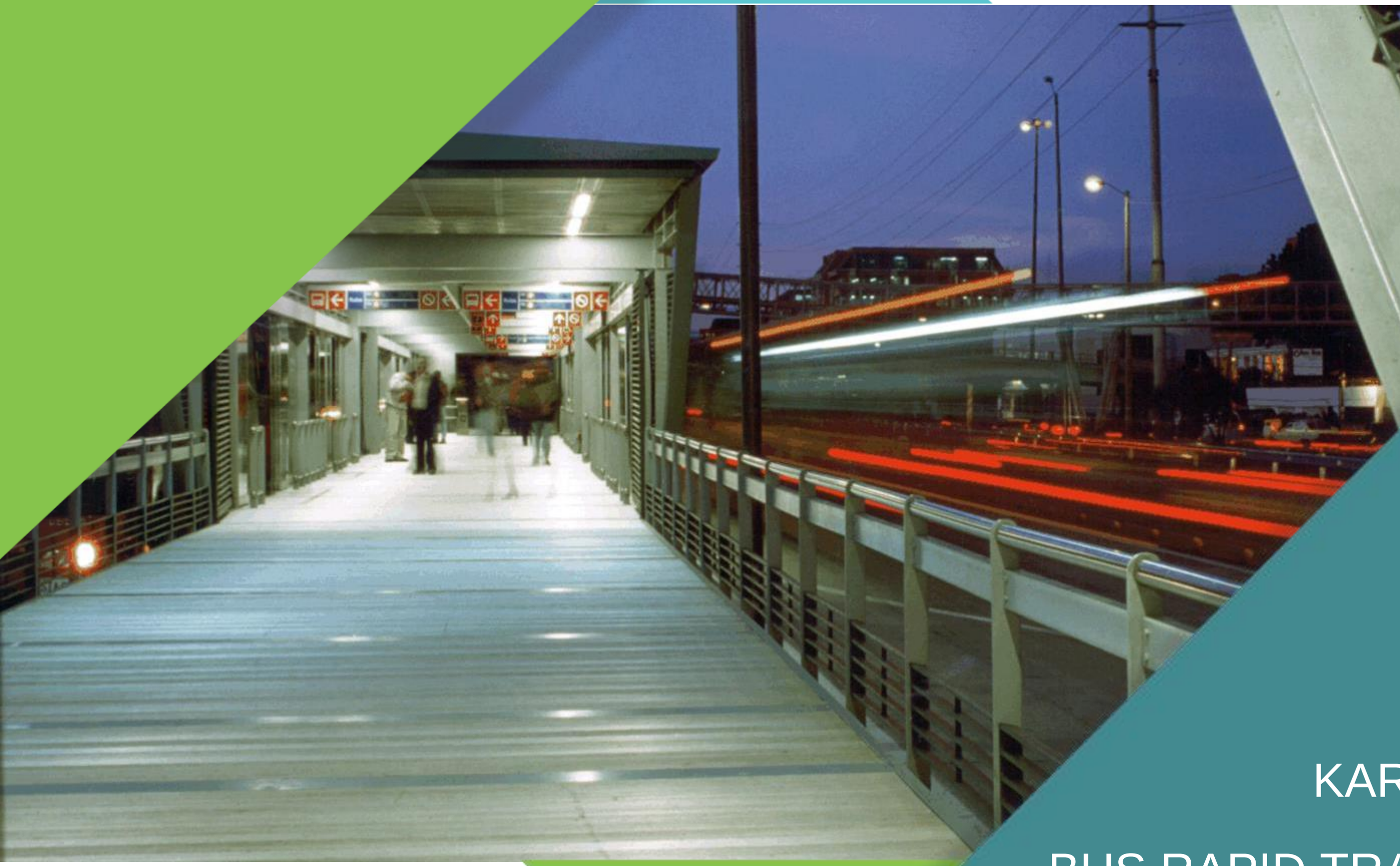
9.1.8. Access authorization must be auditable, i.e. standard system functions provide insight in actual access rights at any time;

9.1.9. In order to reduce vulnerability, The Fare System must be "hardened", e.g. no unnecessary software installed and no unnecessary user accounts or accounts of similar nature or kind;

9.1.10. Physical and logical access to Level 2 and 3 Infrastructures must be limited to authorized employees;

9.1.11. The Contractor must implement a security life-cycle program and must assess annually whether the security architecture and implementation of the Fare System is still fit-for-purpose. If required, the Contractor must act upon outcome of these assessments;

9.1.12. The security of the Fare System must comply with national regulations and international standards (e.g. ISO/IEC 27001).



KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 - DRAFT CONTRACTS

SYSTEM CONTROL AND SERVICE PROVIDER – SECTION 6.1.2 – SCHEDULE A – FLEET MANAGEMENT

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

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1. Glossary

1.1. Abbreviations and Terms

The following abbreviations and terms are used throughout this functional/technical specification document and shall have the meaning attributed to it in this Glossary.

Please note that terms used in this document will at first be accompanied by an associated abbreviation in brackets where after the abbreviation will apply.

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
AFC	Automated Fare Collection
AMS	Asset Management System
AP	Access Point
API	Application Program Interface
AVL	Automated Vehicle Location
AVM	Automated Vehicle Monitoring System
BRT	Bus Rapid Transport
BDMS	Bus Depot Management System
BI	Business Intelligence
BoQ	Bill of Quantities
CCTV	Closed Circuit Television
COTS	Commercial of the Shelf
DVR	Digital Video Recorder
DPI	Dynamic Passenger Information
EFC	Electronic Fare Collection
ERP	Enterprise Resource Planning
FMS	Fleet Management System

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
GNSS	Global Navigation Satellite System
GoS	Government of Sindh
GPS	Global Positioning System
GTFS	Generic Front Feed Specification
GIS	Geographic Information System
GUI	Graphical User Interface
ISO	International Organization for Standardization
ITS	Intelligent Transport System
KMS	Key Management System
KPI	Key Performance Indicator
L0	Level 0
L1	Level 1
L2	Level 2
L3	Level 3
L4	Level 4
LAN	Local Area Network
MADT	Multi-Application Driver Terminal
MMI	Man Machine Interface
ms	Millisecond
MSP	Mobility Service Provider
NFC	Near Field Communications
NTP	Notice To Proceed
OBU	On-Board Unit

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
OCC	Operation Command & Control Centre
PKR	Pakistani Rupee
PT	Public Transport
PTA	Public Transport Authority
PTO	Public Transport Operator
RAID	Redundant Array of Independent Disks
RFP	Request for Proposal
RTI	Real Time Information
RTPI	Real Time Passenger Information
SAM	Secure Access Module
SDC	Station/Depot Computer
SMTA	Sindh Mass Transit Authority
VOC	Vehicle Operating Companies
Contractor (or ITS Contractor)	The successful bidder who will enter into the Contract with the Employer to provide all Goods and Services Obligations required in terms of this Request for Proposal.
City	Karachi
Employer	Sindh Mass Transport Authority

2. Fleet Management Overview

2.1. Introduction

2.1.1. An Intelligent Transportation System (ITS) is an advanced application which, without embodying intelligence as such, aims to provide innovative services relating to modes of transport management and enable passengers to be better informed and make safer, more coordinated, and 'smarter' use of transport networks.

2.1.2. The ITS equipment and software is comprised of all intelligent transportation systems (ITS) deployed at the Operational Control Center, at the BRT stations, along the corridor, at the depots, and on-board the BRT vehicles.

2.1.3. The BRT Red Line Fleet Management is one of the activities and deliverables under the Contractor scope of works. The Contractor will be responsible for operation and management of the Red line Fleet Management in the Karachi BRT.

2.1.4. The successful Contractor shall provide a full-featured and well-proven Fleet Management System (FMS) to achieve the successful BRT Red Line vehicles operation.

2.1.5. The Contractor will ensure integration into the ITS at the Operations and Control Center (OCC) and shall operate and maintain the Fleet Management System (FMS) in accordance with the specifications and requirements stipulated in this Schedule.

The following figure illustrates the key players involved in Fleet Management Systems:

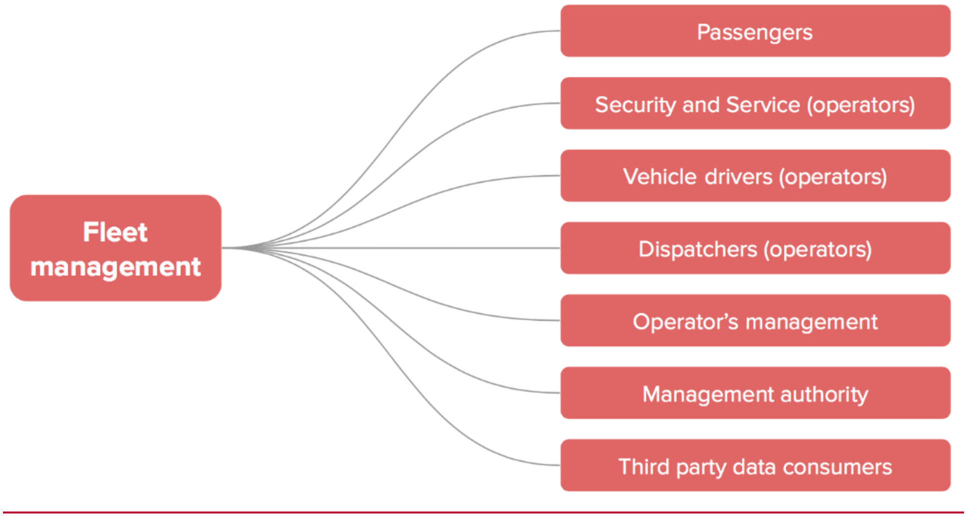

Figure 1: Key players in fleet management systems

2.2. Fleet Management Main Goals

2.2.1. Effective performance of BRT services requires buses to depart at specific scheduled times to prevent multiple buses arriving and departing simultaneously on and from different routes.

2.2.2. The sequencing of buses, bus bay assignment and the overall flow of the operations requires a Fleet Management software solution that generates accurate and reliable information and enables instructing buses to vary their operation, driving the necessary improvement to the overall fleet flow.

2.2.3. Service disruptions on BRT corridors can impact severely on the capacity and work flow of these operations. Unmanaged, inefficient and interrupted services adversely impact on the quality and consequently the acceptance of services by the public, and therefore, on revenues and costs.

2.2.4. In order to ensure the successful buses fleet operation, the Contractor will provide a Fleet Management System (FMS), as part of the ITS solution, in accordance with the Specifications and Requirements provided in this Schedule (and other sections in this RFP where applicable) and shall operate and maintain such system for the duration of the Contract term.

2.2.5. The Contractor will manage the day-to-day operation of the BRT vehicle fleet and keep track of overall fleet performance, while maintaining close communications with the Vehicle Operating Companies, in such a way that the Contractor can easily monitor and adjust the operation, as required in terms of this RFP.

2.2.6. The Fleet Management System (FMS) functions will be provided through the supply of two main subsystems:

a) The Scheduling Management sub-system will enable the Contractor to develop a Master Timetable that will encompass the Dispatch Schedule and the Headway Targets for the BRT vehicles.

b) The Dispatching Management sub-system will provide management and oversight to the fleet operation.

c) The Automated Vehicle Location (AVL) sub-system will ensure efficient information exchange between buses and the Fleet Management Center is present, enabling monitor and control of the BRT vehicles operation.

2.2.7. The following diagram illustrates the expected Fleet Management functional architecture, following an architecture approach similar to other ITS sub-systems:

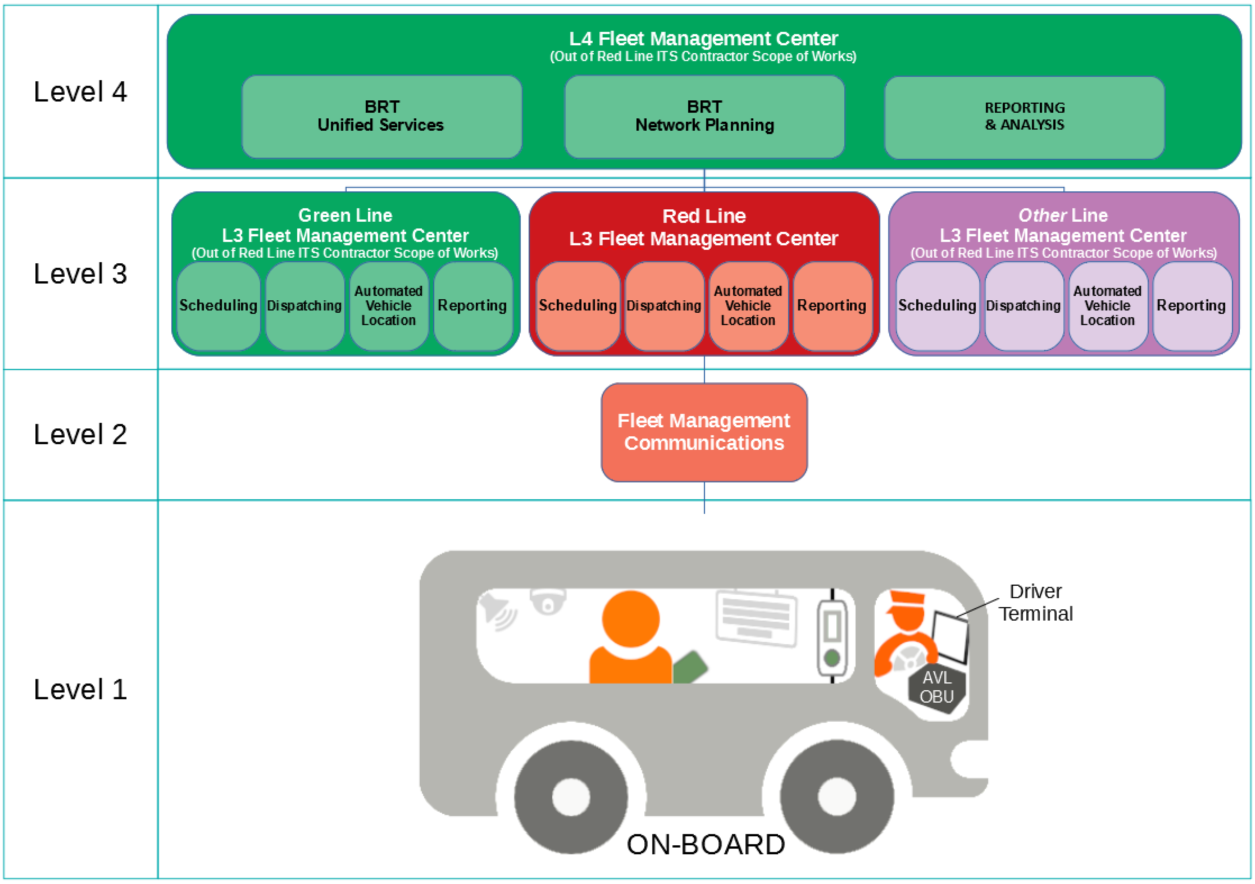
Level 4
L4 Fleet Management Center
(Out of Red Line ITS Contractor Scope of Works)
BRT Unified Services
BRT Network Planning
REPORTING & ANALYSIS
Level 3
Green Line L3 Fleet Management Center
(Out of Red Line ITS Contractor Scope of Works)
Scheduling
Dispatching
Automated Vehicle Location
Reporting
Red Line L3 Fleet Management Center
Scheduling
Dispatching
Automated Vehicle Location
Reporting
Other Line L3 Fleet Management Center
(Out of Red Line ITS Contractor Scope of Works)
Scheduling
Dispatching
Automated Vehicle Location
Reporting
Level 2
Fleet Management Communications
Level 1
Driver Terminal
AVL OBU
ON-BOARD

Figure 2: Fleet Management Functional Architecture Overview

3. Level 4: Central BRT Fleet Management Centre

3.1.1. The Level 4 Central BRT Fleet Management Centre will be not be part of the Contractor's scope of works. The Employer will make this infrastructure available through a third party.

3.1.2. One of the objectives of the L4 Central BRT Fleet Management Centre is to facilitate the overall BRT network planning and scheduling is expected to be performed prior to each operation period.

3.1.3. This key task will involve several stakeholders such as, but not limited to, authorities, marketing/PR, contract management units and the operators of each BRT corridor/ service.

3.1.4. Through the L4 Fleet Management Centre the Public Transport Authority is expected to carry out the following activities:

a) Dispatching Supervision
b) National Crisis Management
c) Interlining/modal Coordination
d) Policies and Enforcement
e) Exception/Emergency Management
f) Contractor Supervision
g) City Event Management

3.1.5. The Contractor shall integrate the Red Line Fleet Management with the L4 features available in the OCC.

4. Level 3 – Scheduling Management

4.1.1. The Employer through the L4 Fleet Management Centre will provide a full-featured and well-proven system for scheduling of BRT vehicle operations, by offering extensive management functionality including identification, recording and maintenance of the network topology, including locations of all routes, on-corridor stations, off-corridor stops, intersections, waypoints, dispatch times, and headway targets.

4.2. Definition of Terms

4.2.1. Block. A block refers to the complete piece of work for the vehicle, which may include multiple routes/interlined trips.

4.2.2. Run. A run refers to the complete piece of work for a Vehicle Operating Company that may include vehicle changes during the course of the day.

4.2.3. Route. A route refers to the overall service identifier, under which there would be a series of route variants.

4.2.4. Route variant. The route variant refers to the series of points that designate a particular path or paths that define the route variant or pattern.

4.2.5. Trip. A trip refers to a specific one-way journey for the vehicle related to start/end times and points.

4.3. Master Timetable

4.3.1. The Contractor will be responsible for developing a Master Timetable which will encompass the Dispatch, Schedule and Headway Targets for the BRT vehicles.

4.3.2. The Master Timetable will be developed based on the core principles of optimum efficiency and maximizing passengers service.

4.4. Integration with Vehicle Operating Companies

4.4.1. The Contractor will create individual Timetables for multiple Vehicle Operating Companies, using standardized and open interfaces.

4.4.2. Timetable information to the Vehicle Operating Companies will be comprised of the scheduled dispatch times and the vehicle headway times for each route as a function of time of the day.

4.5. Roles and Responsibilities

4.5.1. The Employer will provide suitable resources that will be responsible for the development of the Master Timetable.

4.5.2. The Contractor and the Employer will jointly establish a regular program/schedule for updating the Master Timetable, based on the most recent-available information on passenger demand and system profitability.

4.5.3. During day-to-day operations the Contractor will keep track of the performance of the BRT fleet (e.g. adherence to Schedule), give instructions to drivers to optimize operations and shall provide optimum response to incidents that negatively affect the operations. This will all be done in cooperation with the VOCs.

4.5.4. VOCs will perform BRT services in accordance with the instructions issued by the Contractor and in accordance with the Master Timetable.

4.6. Additional Functional Requirements

4.6.1. The Contractor will receive an overview of scheduling and dispatch functions that can be performed utilizing Level 4 Fleet Management Centre software and systems and will be allowed to use these functions.

4.6.2. The schedule management system will be capable of importing the following types of data: BRT vehicle data, station data, GIS data, routes and timetables, and battery charging requirements for the plug-in diesel-electric hybrid vehicles.

4.6.3. The system will allow schedulers to configure and build schedules by route and service.

4.6.4. The schedule management system shall enable schedulers to visualize schedules, lock schedules, and regenerate schedules when running time-data changes. The system shall be capable of integrating the route network data with mapping data.

4.6.5. The system enables schedulers to coordinate and optimize multiple schedules with common points.

4.6.6. The system shall enable schedulers to create deadheads, layovers, interlining vehicle type rules, and garage rules. The module shall have the following features:

a) Assign vehicle through manual, automatic, or heuristic methods and verify block integrity

b) Manipulate blocks in a grid or on a block graph with drag-and-drop capabilities

c) Optimize cost efficiency of block and vehicle assignment

d) Calculate and optimize deadhead routes

e) Provide graphical block profile and display vehicle requirements by time of day.

4.6.7. Schedules shall be available in GTFS for integration with external systems and by external actors. The GTFS feed shall be open.

The following figure illustrates the aforementioned features in L3 Scheduling Management:

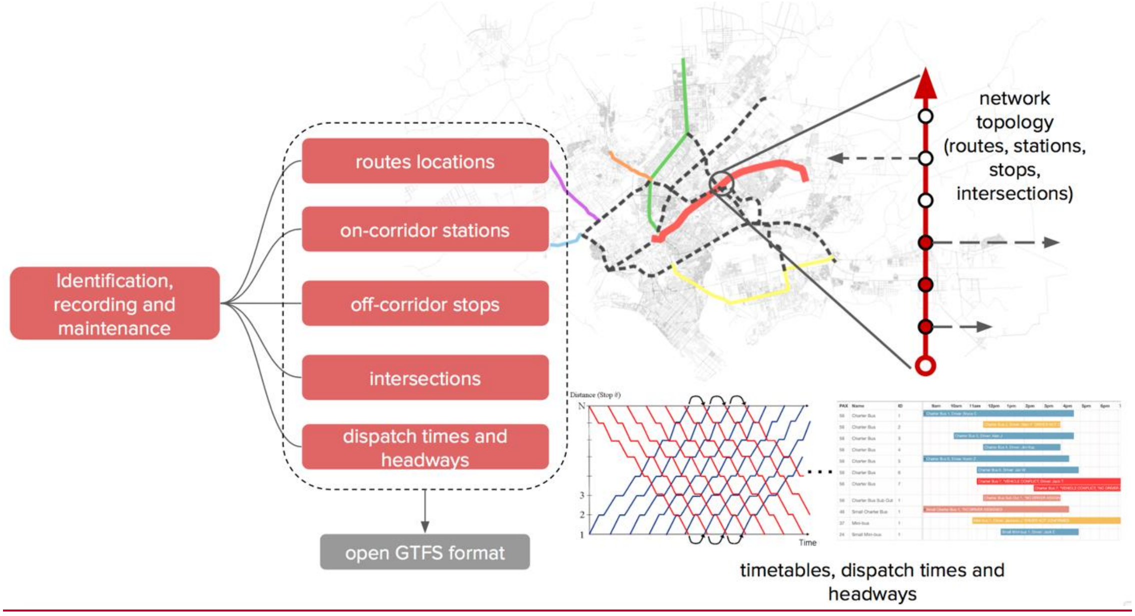
Identification, recording and maintenance
routes locations
on-corridor stations
off-corridor stops
intersections
dispatch times and headways
open GTFS format
network topology (routes, stations, stops, intersections)
Distance (Stop #)
N
3
2
1
Time
timetables, dispatch times and headways

Figure 3: Overview of features in L3 Scheduling Management

5. Level 3 – Dispatch Management

5.1.1. The system will incorporate extensive dispatch management functionality including identification, recording and maintenance of the network topology, including locations of all routes, on-corridor stations, off-corridor stops, intersections, waypoints, dispatch times, and headway targets.

5.1.2. Blocks are defined by the headway between vehicles on the same route.

5.1.3. Off-corridor, the BRT vehicles shall operate at the maximum permissible speed, stopping at:

a) All stops requested by the passengers through the stop-request button on the vehicle; and

b) All stops with waiting passengers;

5.1.4. The off-corridor schedule will also be able to be adjusted in order to ensure proper headways (i.e. AVL messaging to the driver will indicate the appropriate speed to maintain the optimum headway).

5.1.5. On-corridor, headway will be controlled through vehicle speed and waiting time at the first on-corridor station and at defined points on the route.

5.1.6. The Red Line Dispatch Control workstations, to be supplied by the Contractor at the OCC, will provide to the Red Line Dispatch Controllers, at least, the following features:

a) Management of the voice and data transmissions relevant to the operation of the Red Line fleet:

- Receiving automated messages from vehicles (start/end of trip, errors etc.);
- Sending visual instructions to drivers (through the AVL OBU and to be displayed on the Driver Terminal).
- Interchanging messages from drivers, establishing verbal communications with drivers as required to expedite possible incidents resolution.

b) Visualization the vehicles location (GPS tracking);

c) Access to the planned buses schedule;

d) Visualization of the adherence to schedule, by displaying colored charts illustrating timetable deviations (Strip charts);

e) Control of the connection between routes, informing drivers about changes in operation (new vehicle, new route etc.);

f) Provide further information about each object (driver, vehicle number, line, route, buses etc.);

g) Generation and visualization of operational Fleet Management Reports;

h) Management of emergency calls (burglary, accidents etc.);

i) Calling the police and/or the fire brigade in case of emergency;

j) Take control of the information presented on-board the buses to the passengers.

5.1.7. The system shall include the distribution of workloads of the OCC operators by configurable groups of blocks, routes or trips, with all data associated with a block, route or trip on that route being directed to a specific operator.

5.1.8. The workload assignment shall be done in a way that no route can remain unassigned. Regardless of route assignments, all operators must always have the ability to see and monitor all BRT vehicles in the system.

5.1.9. The system shall have extensive user interface facilities to maintain the current operation status in real time (e.g. map-based graphical user interface, tabular and schematic overviews).

6. Level 3 - Automated Vehicle Location (AVL)

6.1. Introduction

6.1.1. The Contractor will provide a full-featured and well-proven system supporting real time vehicles monitoring and coordination of instructions to drivers. To achieve this, the Fleet Management system to be supplied by the Contractor will integrate real time and online two-way communication with the BRT vehicles in such a way, that the Contractor is enabled to easily monitor and adjust operational schedules as and when required.

6.1.2. The AVL system plays a key role in the overall fleet management system to disseminate data to the different data consumers. These consumers may include Operation Management, passengers, third parties, the Public Transport Authority, dispatchers, operators and security and service staff.

6.1.3. All BRT vehicles will be monitored and tracked throughout operations by using at least GPS (Global Positioning Systems) technology to determine the vehicles location in real time. This information will be collected and graphically displayed in the OCC.

6.2. AVL Communication Interface

6.2.1. The Contractor will provide the communication interface between the BRT vehicle driver and the Red Line L3 Fleet Management Center at the OCC, including at least:

6.2.1.1. ***Communicating dispatch times and planned headways***. Changes to the planned dispatch times and headways (short-term planning) should be offline and uploaded online to the affected BRT vehicle and to the VOC on time (can be offline or online data exchange). “On time” means before the start of operation or during operation before the start of execution.

6.2.1.2. ***Voice communication instructions****.* Instructions from the OCC are transferred online to the vehicle and managed there accordingly. As a fallback scenario when online communication is not possible, it is required that there can be communication between the dispatcher and driver (voice communication), which shall lead to a local manual action by the driver that results in the same required output.

6.2.1.3. ***Confidential communications****.* The interface shall allow the driver to communicate confidentially with dispatchers, emergency services, and other pre-defined parties through either the mobile telephone system or through the back-up UHF/VHF communications device;

6.2.1.4. ***Communication initiation***. The Contractor will organize the communications system so that the Operational Control Center can start conversations while the driver can only ask for a conversation;

6.2.1.5. **Pre-*defined messages***. The AVL On-Board Unit (OBU) shall provide for the storage and reconfiguration of pre-defined “canned” messages, each of which shall be configurable to whether acknowledgement is requested from the source, what mode of communication is required, and its relative level of priority;

6.2.1.6. ***Receipt acknowledgement****.* Receipt acknowledgement should be automated for most functions/messages on the correct driver operation or selection of message. The AVL’s driver screen shall facilitate a manual acknowledgement from the driver for certain message types in order to determine whether the driver is operating under normal conditions or under duress; and

6.2.1.7. ***Message queuing****.* The AVL’s driver screen shall facilitate message queuing optimization, including an indication of the number of unread messages in the queue. The driver shall be able to skip a message, delete a message (but only after it has been displayed and acknowledged), save a message to memory, and recall it. All messages shall be subject to receipt acknowledgement (at both ends).

6.2.2. The driver terminal screen shall alert the driver with both a visible and audible signal when a new message is received.

6.3. Communication for Bus Prioritization

6.3.1. The need for Bus Prioritization is determined by utilizing the bus location and determining schedule adherence. If the vehicle is behind schedule, predefined parameter traffic signals may be adjusted to increase speed through the system.

6.3.2. The AVL system will be ready to use Bus Prioritization in case it is implemented.

The following figure illustrates the aforementioned features in L3 AVL:

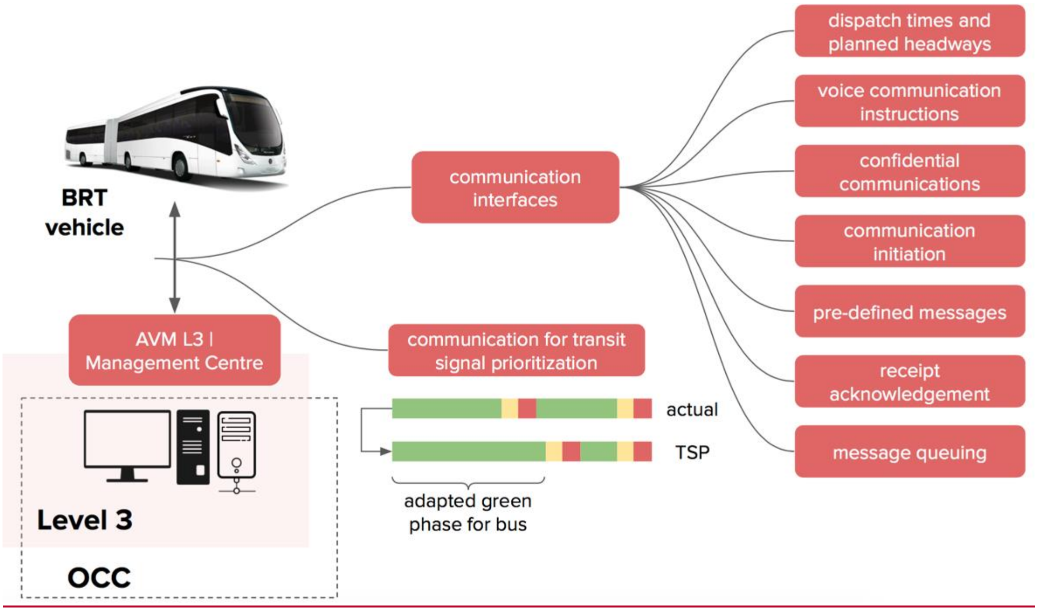
dispatch times and planned headways
voice communication instructions
confidential communications
communication initiation
pre-defined messages
receipt acknowledgement
message queuing
BRT vehicle
communication interfaces
AVM L3 | Management Centre
communication for transit signal prioritization
actual
TSP
adapted green phase for bus
Level 3
OCC

Figure 4: Overview of features in L3 AVL

7. Level 3 – Reporting

7.1.1. Business Intelligence tools will be implemented by the Contractor to create quality reports that will assist to carry out strategic planning tasks.

7.1.2. At least the following reports will be available:

a) Deviations from routes;
b) Deviations at stops and stations;
c) Speed at locations;
d) Waiting times at stops/stations;
e) Transportation service times;
f) Kilometers driven with complete and functioning equipment;
g) Kilometers driven without EFC components; and
h) KPI's compliance.

For reference only, the following figure illustrates the aforementioned features in L3 Reporting, presented as dynamic dashboards:

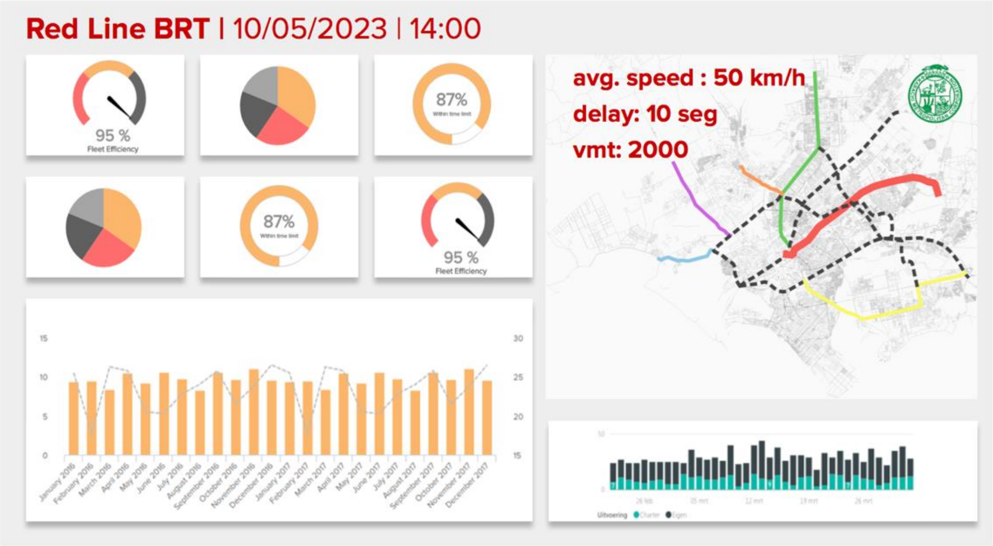

Figure 5: Overview of features in L3 Reporting

8. Level 2: Communication System

8.1.1. The communication network within the ITS systems forms the backbone that interconnects all the elements of the ITS, linking level 1 devices, such as the AVL On-Board Unit, with the depot management systems and upper levels.

8.1.2. The purpose of the communication network is to ensure consistent and reliable connectivity for all ITS elements, including the Fleet Management system equipment along different locations.

8.1.3. Communications during BRT operations will enable:

8.1.3.1. Real time data publication of location;

8.1.3.2. Voice and data communication:

- a) Voice transmission between Dispatcher/OCC and Vehicles;
- b) Voice transmission between Dispatcher/OCC and Service Personnel;
- c) Data transmission between OCC and Vehicles;
- d) Data Transmission between OCC and Passenger information systems;

8.1.3.3. Group calls; and

8.1.3.4. Priority calls.

8.1.4. The wireless network at the Red Line Bus Depots will be provided by the Contractor. This networks will be used by the AVL to perform transmission of large data packages in short time once the BRT Vehicles arrive to the Depot or before leaving the Depot to start the operation.

8.1.5. For further information about the ITS Communication Network requirements, please refer to the following document: 6.1.4.ITS.Schedule A_Goods.CommunicationsNetwork.

9. Level 1: On-Board Devices

9.1. Multi-Application Driver Terminal

9.1.1. A "Multi-Application Driver Terminal" (MADT) shall allow the driver to access or control the multiple applications connected to the on-board ITS components (RTPI, EFC, AVL and CCTV) through an integrated, shared HMI (Human Machine Interface).

9.1.2. The MADT will include at least the following features:

9.1.2.1. Show on the screen the status of the different on-board ITS components.

9.1.2.2. Display the DVR stored videos and real-time CCTV cameras footage.

9.1.2.3. Provide an interface to the public address system making to possible to the driver to perform onboard acoustical announcements to the passengers.

9.1.2.4. Enable the driver to open a public microphone channel with the dispatcher or to open the sound of the passengers area under emergency circumstances.

9.1.2.5. Interact with the on-board RTPI components, triggering the information presented to the passengers.

9.1.2.6. Display the status of the on-board ITS devices.

9.1.3. The MADT will comply with the following functional requirements:

9.1.3.1. The monitor screen shall be highly visible in all lighting conditions to facilitate ease of understanding by the drivers;

9.1.3.2. The screen shall have configurable contrast and brightness settings, suitable for use in low light and full sun conditions;

9.1.3.3. The information shown on the driver touch screen (MMI) shall support the driver, but should not distract the driver, as the focus shall be on safe driving; the screen must be designed to minimize handling by the driver;

9.1.3.4. Different colors should be used to express the urgency of the instruction;

9.1.3.5. The unit shall be equipped with a 10-inch LCD/TFT display or larger capacitive touch-screen, where messages will be displayed to the driver in a font readable at a minimum distance of 1.5 meters; and

9.1.3.6. Summary tables and data lists could be displayed at reduced size but still be readable.

9.1.3.7. The unit will provide an audible tone and display an alarm message to the driver in case of fleet operational violations (e.g. speeding) while also relaying the alarm messages to the Operational Control Center.

9.2. AVL On-Board Unit

9.2.1. The Contractor will equip the BRT Buses with an on-board unit (OBU), a Multi-Application Driver Terminal and any other required components to gather location data and transmit the data to central servers and related software modules. The AVL On-Board Unit (OBU) is an automated system which will include the features specified in this section.

9.2.2. The following chart illustrates the architecture and the main components installed in the buses. Elements represented in green color will be supplied by the BRT vehicles manufacturer.

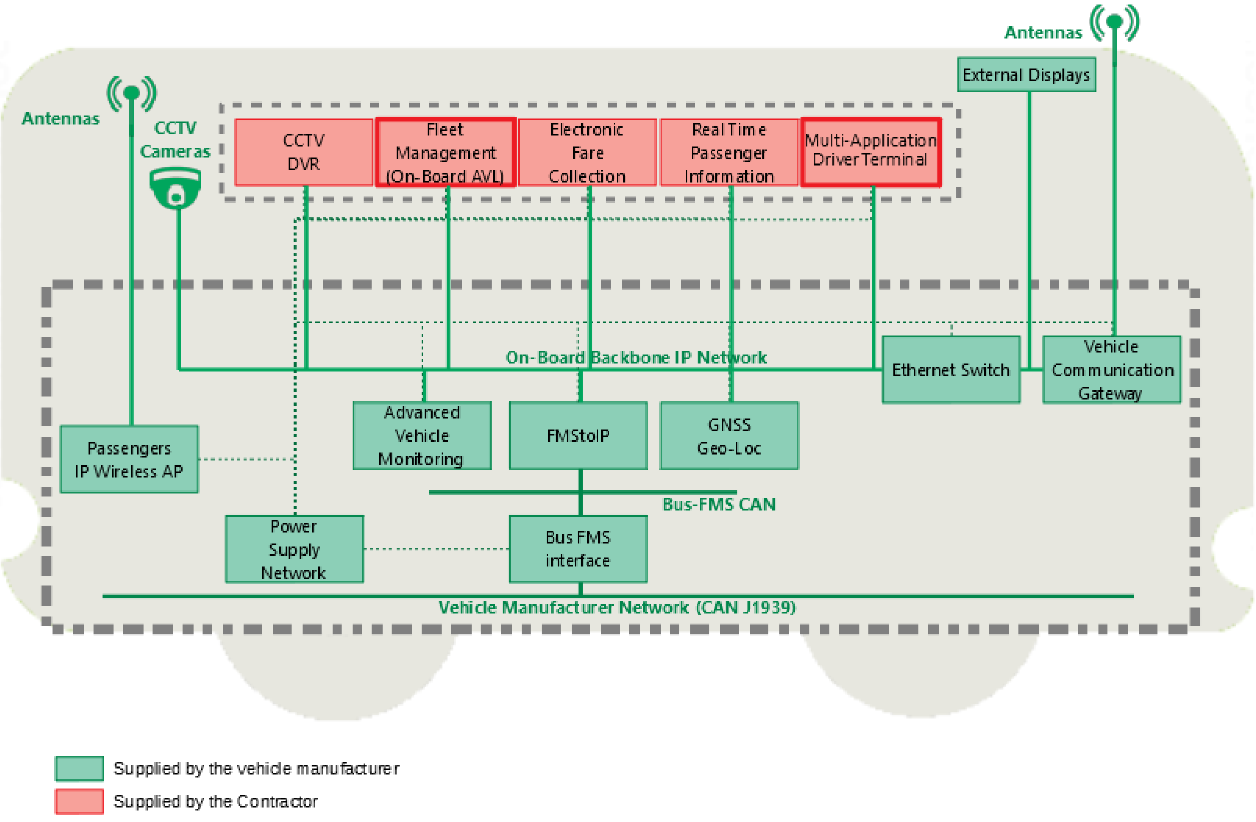
Antennas
External Displays
Antennas
CCTV Cameras
CCTV DVR
Fleet Management (On-Board AVL)
Electronic Fare Collection
Real Time Passenger Information
Multi-Application Driver Terminal
On-Board Backbone IP Network
Ethernet Switch
Vehicle Communication Gateway
Passengers IP Wireless AP
Advanced Vehicle Monitoring
FMStoIP
GNSS Geo-Loc
Bus-FMS CAN
Power Supply Network
Bus FMS interface
Vehicle Manufacturer Network (CAN J1939)
🟩 Supplied by the vehicle manufacturer
🟥 Supplied by the Contractor

Figure 6: Overview of AVL Bus Equipment

The following figure illustrates the AVL bus equipment to be supplied by the vehicle manufacturer and by the contractor:

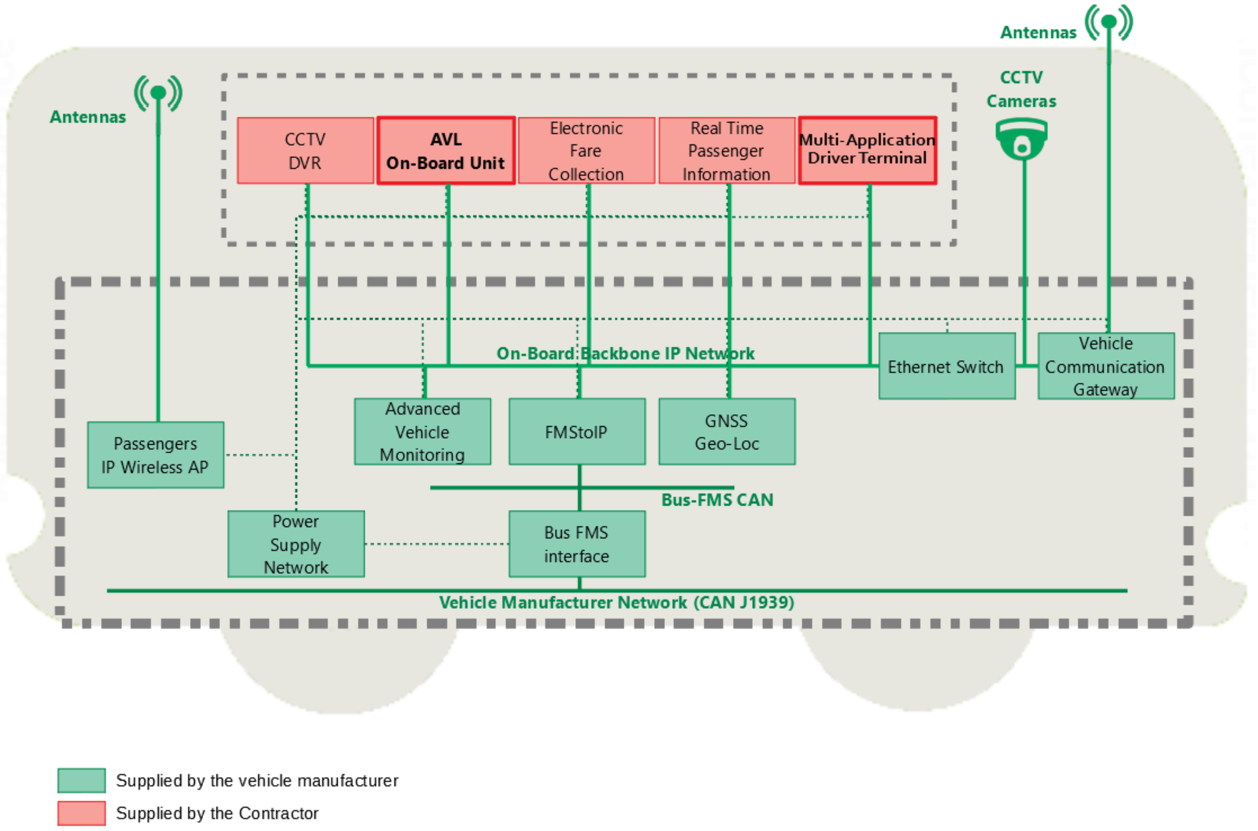
Antennas
Antennas
CCTV Cameras
CCTV DVR
AVL On-Board Unit
Electronic Fare Collection
Real Time Passenger Information
Multi-Application Driver Terminal
On-Board Backbone IP Network
Ethernet Switch
Vehicle Communication Gateway
Passengers IP Wireless AP
Advanced Vehicle Monitoring
FMStoIP
GNSS Geo-Loc
Bus-FMS CAN
Power Supply Network
Bus FMS interface
Vehicle Manufacturer Network (CAN J1939)
🟩 Supplied by the vehicle manufacturer
🟥 Supplied by the Contractor

Figure 7: Overview of AVL Bus Equipment

9.2.3. Data will be gathered via GNSS interfaces to monitor the movement of the vehicles in real time against approved schedules. Distance travelled, and number of trips made by every vehicle will be reported.

9.2.4. Messages from the OCC that are of value to passengers will be displayed on the local RTPI or will be announced by the driver by using the onboard public address system.

9.2.5. Additionally the OBU will trigger audio and visual information to passengers through the RTPI devices available on-board, when necessary.

9.2.6. AVL system’s messaging shall be configurable on a system-wide basis continuously;

9.2.7. On-board equipment faults detected by the on-board unit shall raise an alarm within 10 seconds in the Operational Control Center.

9.2.8. The AVL On-Board Unit (OBU) will automatically and continuously locate and report to the OCC the accurate and actual (real time) positions of vehicles. The AVL On-Board Unit (OBU) shall enable the Operational Control Centre to at all times identify the exact location of each BRT vehicle within an accuracy of 10 meters.

9.2.9. The system will automatically calculate the timetable deviation and headway where applicable. Based on the relative vehicle position, the AVL On-Board Unit (OBU) will communicate to the driver any corrective measures to be taken in terms of schedule and operating speed.

9.2.10. The OBU will allow real time coordination with the OCC and other vehicles using voice and data communications;

9.2.11. Voice and visual information will be available to the driver regarding the service performance (driver duty, schedule adherence, messages, instructions and other information to comply with service requirements); and

9.2.12. Through the MADT, the OBU shall mainly display the headway performance information (with accompanying instructions for corrections). The display shall also offer system-wide transit time, vehicle status (in/out of service), data messages, next stop names and destination names;

9.2.13. Based on vehicle location, a schedule and headway comparison shall be calculated, and the results shall be shown to the driver in the form of operational instructions. The MADT shall present the instructions in two forms:

a) In plus or minus time deviations (+/- minutes and seconds) from the targeted headway; and

b) Targeted speed (kilometres per hour) to achieve the optimal headway;

9.2.13.2. This comparison shall be executed on a regular basis, meaning x-seconds (x is configurable) and information shall be updated only if changed;

9.2.14. All locational data shall be available on-board the BRT vehicle, and transferred to the Operational Control Center, including all related data, every x-seconds (x is configurable). To be able to perform these tasks, The Contractor will ensure that the on-board data is valid, meaning accurate data from the planning/scheduling system shall be compared with the real time status.

9.2.15. The on-board AVL system shall be accessible only through a single log-in procedure to provide driver access. Authorization may be based on biometric or smart-card identification.

9.2.16. The system shall be arranged to allow for the option of requiring the driver to log-out of the system.

9.2.17. Changing personnel shifts shall only be permitted after log-off and the logging in of the operator taking over.

9.2.18. The unit shall automatically start up when vehicle ignition is turned on. The system shall initiate the shutdown sequence after a configurable time (level of minutes) has lapsed after the vehicle has been turned off in order to preserve vehicle battery;

9.2.19. Online data communication should be available during all operational times.

9.2.20. The AVL OBU will comply with the following technical requirements:

AVL OBU Technical Minimum Requierements	
Aspect	Minimum requirements
Time to start-up	Warm start within 20 seconds. In all cases, the GPS shall be ready to use within 90 seconds.
interfaces	• Advanced Vehicle Monitoring • Real Time Passenger Information • GNSS Geo-Location • Electronic Fare Collection (if necessary) • FMStoIP (if necessary)

Measurement rate	1 per second
Positional accuracy ***(dependent to the GNSS geolocation device provided by the vehicle manufacturer)***	• Less than 10 meters in 95% of measurements with an unobstructed view of 5 satellites or more • Less than 50 meters in 95% of measurements using odometer driven dead-reckoning in case of loss of GPS-fix, provided that the last fix was not more than 60 seconds ago. • Must communicate its accuracy with each position.

Table 1: AVL OBU Technical Requirements

9.3. Emergency Protocols

9.3.1. For security reasons a documented protocol shall be established and put in place to manage emergency situations. The ITS shall facilitate the automated response to emergencies.

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 - DRAFT CONTRACTS

SYSTEM CONTROL AND SERVICE PROVIDER – SECTION 6.1.3 – SCHEDULE A – REAL TIME PASSANGER INFORMATION

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1. Glossary

1.1. Abbreviations and Terms

1.1.1 The following abbreviations and terms are used throughout this functional/technical specification document and shall have the meaning attributed to it in this Glossary.

1.1.2 Please note that terms used in this document will at first be accompanied by an associated abbreviation in brackets where after the abbreviation will apply.

1.1.3 Abbreviations and terms that has been attributed a specific meaning in other specification Chapters associated with this tender document will have a similar meaning as attributed to it in that Chapter, unless specified differently in the glossary hereunder.

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
AFC	Automated Fare Collection
API	Application Program Interface
AVL	Automated Vehicle Location System
AVM	Automated Vehicle Monitoring System
BRT	Bus Rapid Transport
BI	Business Intelligence
BoQ	Bill of Quantities
COTS	Commercial of the Shelf
EFC	Electronic Fare Collection
DPI	Dynamic Passenger Information
DPID	Dynamic Passenger Information Display
GoS	Government of Sindh
GPS	Global Positioning System
GTFS	Generic Front Feed Specification

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
GIS	Geographic Information System
GUI	Graphical User Interface
HHM	Hand held Machine
IP	Internet Protocol
ISO	International Organization for Standardization
ITS	Intelligent Transport System
L3	Level 3
L4	Level 4
LAN	Local Area Network
LCD	liquid crystal display
LED	Light-Emitting Diode
MIVD	Mobile Inspection and Validation Device
ms	Millisecond
MS	Mobility Scheme
MSM	Mobility Scheme Manager
MSP	Mobility Service Provider
MTBF	Mean Time Between Failures
OCC	Operations and Control Center
OBU	On Board Unit
OEM	Original Equipment Manufacturer
PA	Pubic Address
PAS	Public Address Sub-System
PKR	Pakistani Rupee

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
POE	Power Over Ethernet
PT	Public Transport
PTO	Public Transport Operator
RAID	Redundant Array of Independent Disks
RAM	Random Access Memory
RFID	Radio-Frequency Identification
RFP	Request for Proposal
RTPI	Real Time Passenger Information
SIRI	Service Interface for Real Time Information
SMTA	Sindh Mass Transit Authority
SSD	Solid-State Drive
VPN	Virtual Private Network
Contractor **(or ITS Contractor)**	The successful bidder who will enter into the Contract with the Employer to provide all Goods and Services Obligations required in terms of this RFP.
City	Karachi
Employer	Sindh Mass Transport Authority

2. Real Time Passenger Information System Overview

2.1. Introduction

2.1.1. The Intelligent Transport System (ITS) equipment and software comprises of all ITS deployed at the Operational Control Center (OCC), at the Bus Rapid Transport (BRT) stations, along the corridor, at the depots, and on-board the BRT vehicles.

2.1.2. The Real Time Passenger Information (RTPI) System is one of the principal activities associated with the ITS services. The ITS Contractor is responsible for ensuring that real-time passenger information is available and displayed through passenger information screens on-board the vehicles and at the stations.

2.2. RTPI Main Goal

2.2.1. During BRT operations, relevant information for passengers will be collected from the various sources, consolidated and distributed to various stakeholders' systems.

2.2.2. Through the operation of the RTPI system, commuters will be informed of the service times and schedules at bus stops, stations and points of interest. The RTPI Systems will deliver accurate service, connection and transfer information for all BRT lines and potentially other modes of public transport.

2.2.3. The ITS Contractor will ensure that all the RTPI equipment and software is mounted in a unified visually appealing manner and that all the equipment is integrated with the equipment installed in the stations, BRT vehicles and OCC.

2.2.4. A Commercial Off the Shelf (COTS) software packages are preferred for both back office and field equipment.

2.2.5. Dynamic information will be presented on Dynamic Passenger Information Displays (DPID), acoustically through the speakers of the Public Address Sub-System.

2.2.6. The RTPI system will be available during all BRT operating hours.

2.2.7. The RTPI system will receive updates regarding deviations from the dispatch and headway schedule and other information relevant to commuters.

2.2.8. The RTPI system will, as soon as reasonably possible after receiving such information, update passenger information displays at least every ten (10) seconds with updated information.

2.2.9. Both the Stationary Public Address Sub-System and the On-Board Public Address Sub-System will be part of the RTPI System and will therefore function in an integrated manner.

The following figure illustrates some of the main RTPI elements during a typical trip

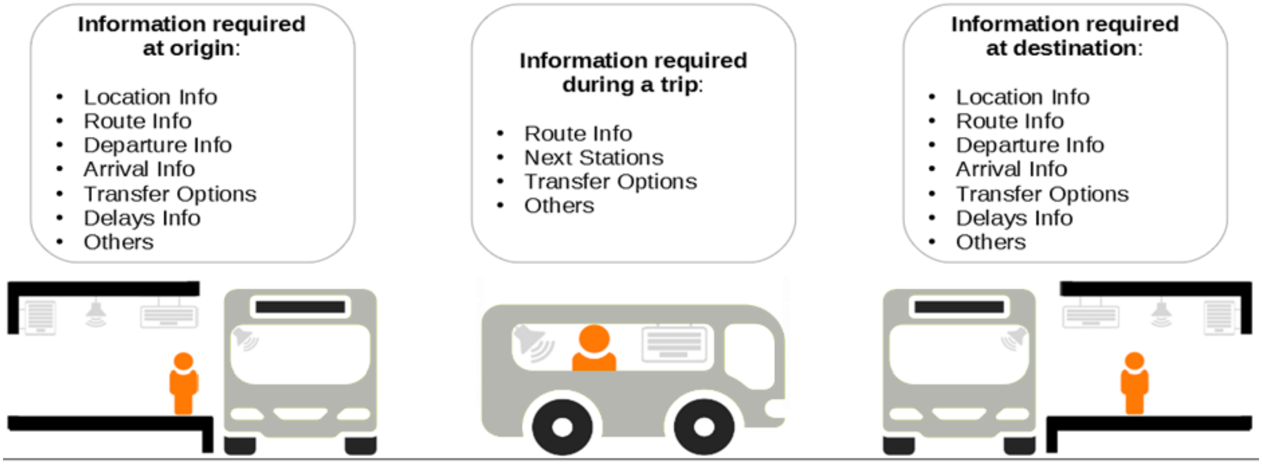

Figure 1: Real Time Passenger Information (RTPI) Overview

2.3. ITS Contractor Roles and Responsibilities:

2.3.1. The ITS Contractor is responsible for ensuring that real-time passenger information is available on-board the vehicles and at the stations. The ITS Contractor will generate the information to be displayed, based on the actual, real-time arrival of the BRT vehicles.

2.3.2. The ITS Contractor will procure, integrate, deploy, commission, and operate each of the RTPI components for the system. In the event that there are systems and services not specifically mentioned in this document that are required for the operations and maintenance of RTPI equipment and software, the ITS Contractor will treat these as an integral part of its RTPI Service Provider obligations.

2.3.3. The ITS Contractor will design, supply, install, and maintain all the necessary hardware and software to integrate with the Green Line OCC (L4 RTPI Management Center) to distribute RTPI to passengers through information displays and the public address speakers.

2.3.4. Ownership of all the equipment purchased in terms of the Contract will rest with the Employer and will be used specifically for the BRT System or for such purpose as the Employer may specify in writing from time to time.

2.3.5. The ITS Contractor will manage and generate, when necessary, the information to be disseminated.

2.3.6. The ITS Contractor will generate and distribute all RTPI information through an open Application Program Interface (API) for integration with third party entities.

2.3.7. The ITS Contractor will ensure that the RTPI information is transferred to the appropriate location and that the information is readily available and easily readable or understandable to the passengers.

2.3.8. The ITS Contractor is responsible for all maintenance, including preventive and corrective maintenance of the RTPI equipment and software. The ITS Contractor will ensure that all maintenance is conducted in such a manner to allow the continuance of all RTPI Services that are not directly impacted by the maintenance activity.

2.3.9. Preventive maintenance. No preventive maintenance may be attended to by the ITS Contractor during Operations Hours and thirty (30) minutes immediately prior to start of BRT Operations Hours

(Operational Hours), provided that the preventive maintenance on Bus RTPI equipment may be attended to during off-peak hours at depots and the staging area subject to reasonable approval by the Employer.

2.3.10. Corrective maintenance. Corrective maintenance may be attended to at all times.

2.4. ITS Architecture Technical Overview

2.4.1. The architecture of the RTPI system within the overall ITS architecture is illustrated in Figure 2 hereunder with the Red Line RTPI system highlighted in red and shown integrated within the complete Public Transport System.

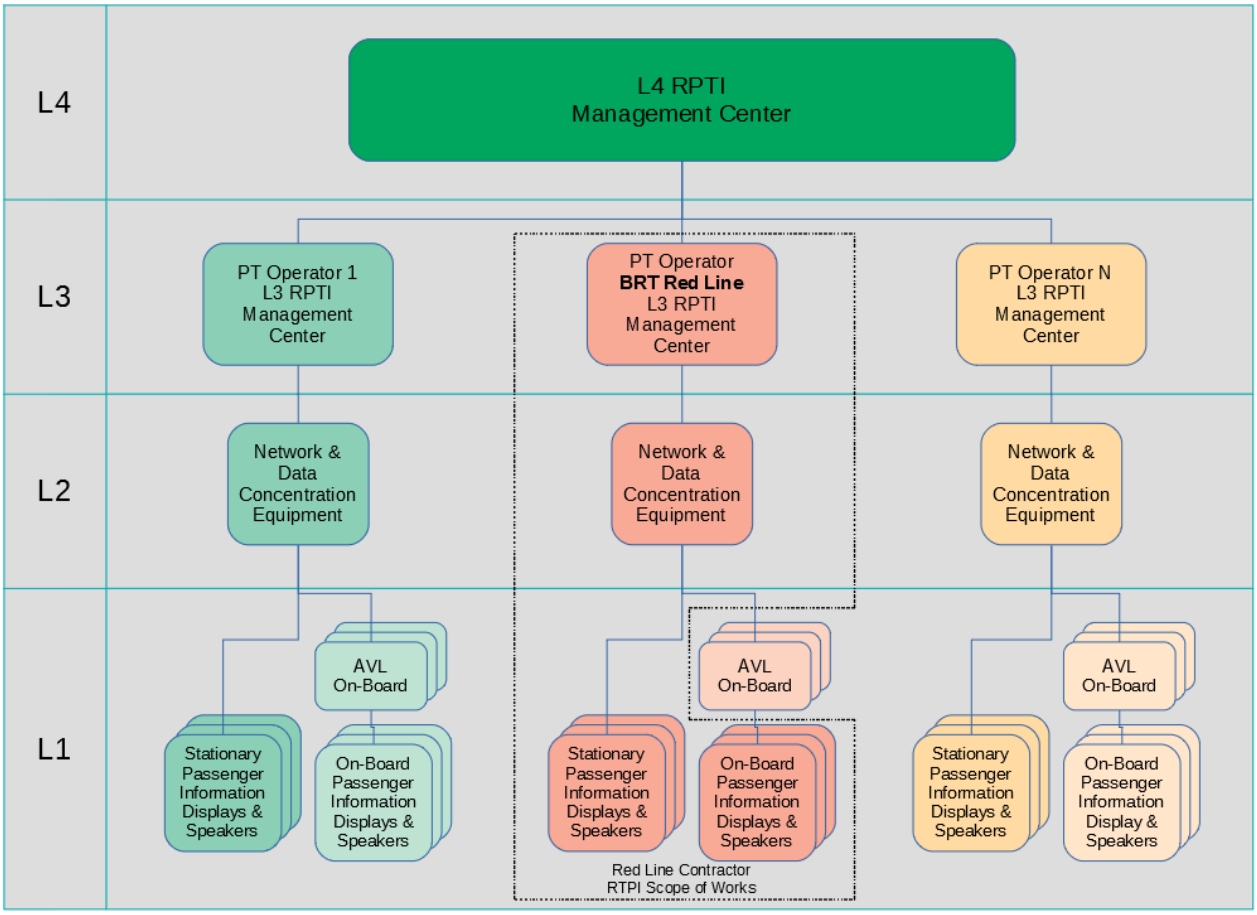
L4
L4 RPTI Management Center
L3
PT Operator 1 L3 RPTI Management Center
PT Operator BRT Red Line L3 RPTI Management Center
PT Operator N L3 RPTI Management Center
L2
Network & Data Concentration Equipment
Network & Data Concentration Equipment
Network & Data Concentration Equipment
L1
AVL On-Board
Stationary Passenger Information Displays & Speakers
On-Board Passenger Information Displays & Speakers
AVL On-Board
Stationary Passenger Information Displays & Speakers
On-Board Passenger Information Displays & Speakers
AVL On-Board
Stationary Passenger Information Displays & Speakers
On-Board Passenger Information Display & Speakers
Red Line Contractor RTPI Scope of Works

Figure 2: Overview Real Time Passenger Information (RTPI)

2.5. RTPI Back Office

2.5.1. The L4 RTPI Management Center, which is provided by (an a agent of) the Employer (and therefore not part of the Red Line ITS Contractor scope of works), will collect from the L4 AVL Management Center the following data to determine the current status of the public transport system operation: Production Timetables, Estimates, Actual Timetables and Delay Information.

2.5.2. After collecting the information required, the L4 RTPI Management Center will distribute the real-time passenger information regardless of the source of input.

2.5.3. The L4 RTPI Management Center (out of scope of the ITS Contractor) will accommodate the following main features:

2.5.3.1. Managing various data sources from the different operators;

2.5.3.2. Merging data from different systems/operators;

2.5.3.3. Recognition of changes and redundancies in data sets (like time table data, route referencing, geo referencing, others;) and

2.5.3.4. Unified stop identification and network data.

2.5.4. L3 RTPI Management Center, under the scope of the ITS Contractor, will be able to perform the following tasks:

2.5.4.1. Data Collection:

a) A planned schedule data (production timetable) will be collected every day from all participating OCC/AVL using standardized interfaces;

b) Actual schedule data (estimated timetable), which include actual delays, cancelled or additional trips, will be are collected cyclically from the L4 RTPI Management Center and Red Line AVL system; and

c) The data collection interfaces require data standardization, high availability and speed to ensure an accurate information exchange.

2.5.4.2. Data Representation:

a) Data from different sources will be transformed into a single data set:
   i. Same time base; and
   ii. Translation of names and identifiers.

2.5.4.3. Filtering:

a) Data related to the destination Dynamic Passenger Information Displays (DPID) will be filtered when necessary; and

b) In case of any data change, a spontaneous data transmission will be initiated.

The following figure illustrates the aforementioned features within RTPI back office (L3 and L4):

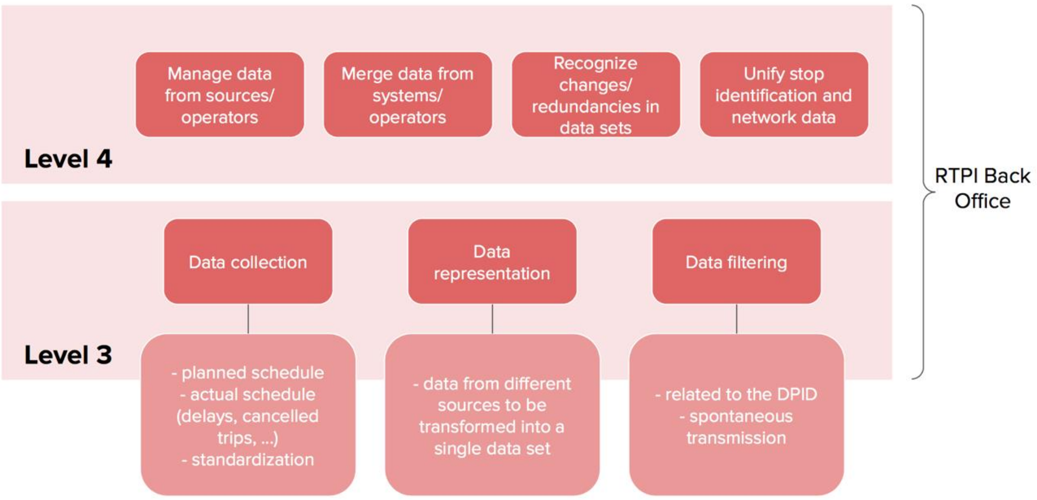
Manage data from sources/ operators
Merge data from systems/ operators
Recognize changes/ redundancies in data sets
Unify stop identification and network data
Level 4
Data collection
Data representation
Data filtering
Level 3
- planned schedule - actual schedule (delays, cancelled trips, ...) - standardization
- data from different sources to be transformed into a single data set
- related to the DPID - spontaneous transmission
RTPI Back Office

Figure 3: Overview of the within RTPI Back Office

2.6. Stationary RTPI Equipment

2.6.1. In order to provide passengers with a uniform customer experience, RTPI features and equipment aesthetics will be unified all along the BRT system.

2.6.2. Stationary DPID will be integrated in the BRT stations in a visually appealing manner.

2.6.3. The Real Time Passenger Information system at BRT stations will comprise of:

2.6.3.1. Dynamic Passenger Information Displays (DPID):

a) Station Entrance Passenger Information displays ;

b) Docking Bay Passenger Information displays; and

2.6.3.2. A Station Public Address Sub-System.

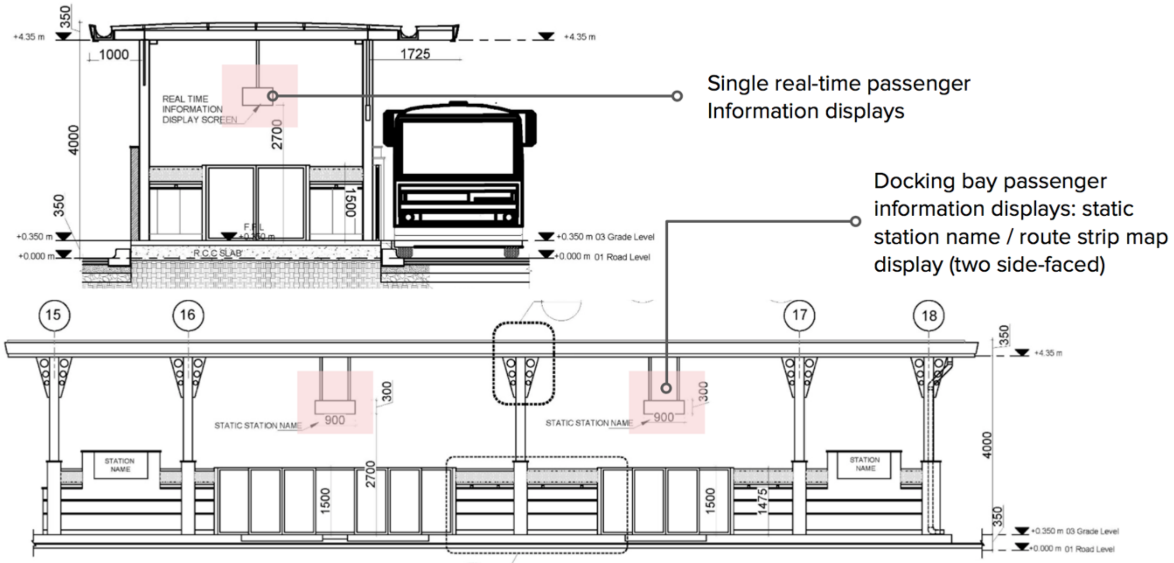

Figure 4: Stationary RTPI Equipment Overview

2.6.4. Displays will have an adequate line length to ensure that the required RTPI displayed is readable.

2.6.5. The DPID will be capable of displaying information, simultaneously and alternatively, in Urdu and English.

2.6.6. When alternating messages in two languages, the alternating interval will be configurable and will initially be configured to 6 (six) seconds.

2.6.7. The DPID will be capable to broadcast full color video entertainment, news, public service announcements, and advertisements.

2.6.8. The DPID will primarily sgiw a strip map, showing the route and next stations of the next vehicle arriving at the docking bay..

2.6.9. The DPID will be integrated with the Public Address Sub-System.

2.6.10. DPID will accommodate a dual screen splitting function that will allow content displays in two separate areas. This functionality will allow the simultaneous or alternative display of trip information (route, destination, next station, etc.) and news, service announcements or advertisements.

2.6.11. Station Entrance PID:

2.6.11.1. Objective. The PID at the station entrance will assist passengers identify the applicable platform for their required service. The station entrance PID will also provide an indication of the estimated number of minutes until the arrival of at least eight (8) BRT vehicles, including at least one (1) reported time of arrival for each direction of each route.

2.6.12. Docking Bay Passenger Information Display:

2.6.12.1. Objective**.** The docking bay PID will enable passengers to confirm that they have the correct docking bay for their required route and their required direction of travel. The docking bay

PID will also indicate the number of minutes remaining until the arrival of the next three (3) BRT vehicles for each direction of each route.

2.6.13. Station Public Address Sub-System:

2.6.13.1. Objective**.** The Station PA Sub-System comprises of microphones, amplifiers, ambient noise sensing microphones, ambient noise compensators, loudspeakers, and any other related equipment that enables the broadcasting audio information, announcements and emergency messages to passengers at the stations.

2.7. On-Board RTPI Equipment

2.7.1. The On-Board DPID system at stations will be comprised of:

a) On-board Internal DPID displays;

b) On-board External DPID Information displays; and

c) On-board Public Address Sub-System.

2.7.2. Displays will have an adequate line length to ensure that the expected information that will be displayed is readable.

2.7.3. On-Board DPID system will be capable of displaying information, simultaneously and alternatively, in Urdu and English.

2.7.4. When alternating messages in two (2) languages, the alternating interval will be configurable and will initially be configured at 6 (six) second.

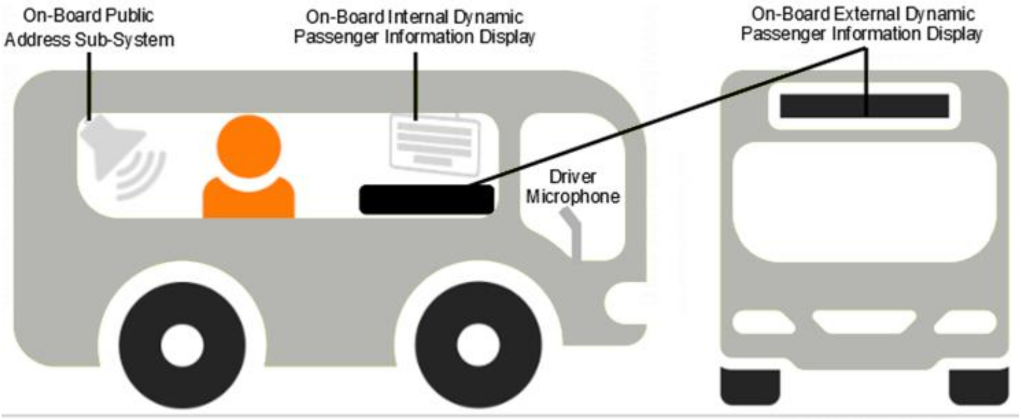
On-Board Public
Address Sub-System
On-Board Internal Dynamic
Passenger Information Display
On-Board External Dynamic
Passenger Information Display
Driver
Microphone

Figure 5: On-Board RTPI Equipment Overview

2.7.5. Bus Vehicle On-Board Internal DPI Display:

2.7.5.1. Objective. The On-Board Internal DPID will enable passengers to reconfirm their route, final destination and to identify the bus station where the passenger intends to decent the BRT vehicle.

2.7.5.2. The On-Board Internal DPID will work in an integrated manner with the Public Address Sub-

System at the location where the displays are installed.

2.7.6. Bus Vehicle on Board External DPI Display

2.7.6.1. Objective: On Board External DPID messages will enable passengers to easily identify the route and destination of the particular BRT vehicle before boarding.

2.7.7. Bus Vehicle On-Board PA Speakers

2.7.7.1. Objective. The On-Board PA Sub-System comprises of microphones, amplifiers, ambient noise sensing microphones, ambient noise compensators, loudspeakers, and any other related equipment with purpose of broadcasting onboard audio information, announcements and emergency messages to passengers at the stations.

2.8. Other On-Board Components supplied by ITS Service Supplier

2.8.1. The ITS Contractor will provide any additional on-board BRT ITS components that may be necessary, including those elements associated with the passenger’s information, required for the operation of the RTPI. It is not within the scope of this document to describe the requirements associated with these additional on board ITS equipment requirements, which will be addressed separately.

3. RTPI Overall Requirements

3.1. RTPI Architecture

3.1.1. By architecture and by design the RTPI system will be scalable, i.e. increase of the transaction load, increase of the number of users and buses, and additional use for non-public transport services which may lead to the commissioning of additional processing-, storage-, or network capacity. The scalability requirement may however not lead to changes in architecture or design of the RTPI system or its applications.

3.2. L3 RTPI System Management Center Sizing

3.2.1. The system shall be able to manage a minimum of one thousand (1,000) concurrent clients (including passenger information displays and third party-systems).

4. L3 RTPI Management Center Functional Requirements

4.1. L3 RTPI Management Center General Requirements

4.1.1. The L3 RTPI Management Center will have extensive user interaction facilities to maintain the current operation status in real time.

4.1.2. The L3 RTPI Management Center will be designed as a stand-alone solution, independent from any superordinate L4 (level 4) RTPI Management Center hardware, which can be located at different places.

4.2. L3 RTPI Management Center Back office

4.2.1. Server location. The Contractor shall procure all L3 RTPI Management Center server hardware that will be hosted in the OCC.

4.2.2. Initial capacity includes contingency for Level 1-3 RTPI infrastructure failures and network outages.

4.2.3. Level 3 RTPI infrastructure will have an uptime requirement of 99.9%.

4.2.4. Data will stay available online for as long as needed for operational, audit or compliancy purposes.

4.2.5. The Contractor is responsible for all data back up and archiving. Data backup and archiving will be performed daily. A complete Redundant Array of Independent Disks (RAID) system with full redundancy will be utilized.

4.2.6. Routine back up and archiving programs will be in place for all data in the system. If certain archived data needs to be reviewed the data will be easily retrievable.

4.2.7. The daily backups will be stored in a secure secondary location at a distance that guarantees availability in case of a disaster of any kind on the primary location.

4.2.8. Failure of individual components or services (e.g. power supply and cooling) may not lead to Level 4 RTIP non-availability. Redundancy will be built in wherever necessary.

4.2.9. Recovery and restart mechanisms and processes will ensure resumption or continuity of services without data loss.

4.2.10. Redundancy and recovery and restart mechanisms will be tested after every major system upgrade, but at least once per year.

4.2.11. A fully functional second server (disaster) system will be used as a “warm” standby solution which will be installed at a separate site.

4.2.12. In case of a major disaster (e.g. flooding, earthquake, fire) in the Level 3 RTPI data center or OCC, contingency will guarantee that services are restored within forty-eight (48) hours. During this time of non-availability, provisional settlement will continue based on historical average settlement values.

4.2.13. The following minimum RTPI System features will be considered:

4.2.13.1. Disaster server in warm standby;

4.2.13.2. Data synchronization, between main data center and disaster site, at least every hour;

4.2.13.3. Manual switch at data center to overcome the failure; and

4.2.13.4. All connections will be re-routed automatically and are available without re-booting affected devices (e.g. EFC, internet services, bank interface).

4.2.14. The L3 RTPI Management Center will include functionality to set up standard periodic reports that would be automatically sent to an identified user or user group.

4.2.15. The L3 RTPI Management Center will log all additions and changes to and interactions with the system parameters and data.

4.2.16. The Contractor will be responsible for the availability of RTPI equipment and software and for the delivery of RTPI devices.

4.2.17. The Contractor will provide help-desk and incident tracking services to its personnel and to the Employer.

4.3. OCC RTPI Work Stations Requirements

4.3.1. The L3 RTPI Management Center shall be operated using workstations in the OCC.

4.3.2. RTPI workstations will be used to administrate dynamic passenger information displays and the public address sub-system.

4.3.3. By using the RTPI workstations, the corresponding system users will be able to generate and disseminate messages to selected Public Address speakers.

4.3.4. Additionally, the RTPI workstations will be used to generate and disseminate messages to selected DPIs.

4.4. L3 RTPI System User Rights

4.4.1. Only authorized system users will be granted access to the L3 RTPI application, giving authorized users' access to the monitoring, configuration and management functionalities supported.

4.4.2. System users control will be based on the establishment of user groups, users, and roles under control of configurable systems administration tools. A minimum of three (3) levels of access will be available, being administrator, controller, and viewing rights only.

4.5. RTPI System Status Monitoring and Alarms

4.5.1. The central system will include functionality to deal with display serviceability status like unserviceable, change of and to reassign out of service displays.

4.5.2. Errors on the displays will be reported directly to the central RTPI system and managed.

4.5.3. The system software will perform continuous systems diagnostics and configurations and will report failures to the L3 RTPI workstations authorized users. This also includes all the failures from on-board units being forwarded to the central system. All this information will be logged into the database.

4.5.4. Features will include controls over data transfer to prevent loss of file and data.

4.5.5. System alarms will include, but not be limited to:

  4.5.5.1. Erroneous data detection (including imports).

  4.5.5.2. Erroneous equipment status.

4.5.6. All alarms will be logged and stored in the database along with a history of corrective action.

4.5.7. System access control will be based on the establishment of user groups, users, and roles under the control of configurable systems administration tools. A minimum of three (3) levels of access will be available; administrator, controller, and view rights only.

4.5.8. All alarms will be logged and stored in the database along with history of corrective action.

4.6. RTPI System Configuration Capabilities

4.6.1. The ITS Contractor will be able to configure the type of information to be shown on a passenger information display. Examples of information are:

  4.6.1.1. Next-stop planned arrival time, and deviation from plan; and

  4.6.1.2. Next vehicle arriving at Station, planned arrival time, and deviation from plan.

  4.6.1.3. Scheduling and messaging functionality. The system will facilitate both basic scheduling information and operational messaging.

4.6.2. The RTPI system design will be flexible and modular, resulting in a system that will be able to provide passenger information for BRT service and regular/feeder bus line services (in the future).

4.7. Integration between L4 RTPI and L3 RTPI

4.7.1. Information regarding the route, next arrivals and departures, etc., to be exchanged between the L4 RTPI Management Center and the L3 RTPI Management Center, will be transmitted using SIRI Services. The Service Interface for Real Time Information or SIRI is an XML protocol to allow distributed computers to exchange real time information about public transport services and vehicles. SIRI is based on the CEN Transmodel abstract model for public transport information and comprises a general-purpose model, and an XML schema for public transport information.

4.7.2. Based on the diverse announcements, RTPI filters will be applied to estimated timetables for transit and broadcast to applicable DPIs, the information to be displayed will be transmitted by using SIRI

PT or ET or ST services.

4.7.3. The L3 RTPI Management Center shall support import and export of RTPI data per the Generic Transit Feed Specification (GTFS) and its real-time equivalent.

4.8. Information Flow between L3 RTPI Management Center and Dynamic Passenger Information Displays

4.8.1. After finalizing start up procedure all DPID will generate a message including its identification, its position (stop / station) and a list of public transport lines [plus direction, if necessary], which will be displayed.

4.8.2. DPID will send cyclically a report summarizing system status (heartbeat).

4.9. OCC RTPI Workstations Requirements

4.9.1. The L3 RTPI Management Center will be operated using workstations in the OCC.

4.9.2. RTPI workstations will be used to administrate dynamic passenger information displays and public address sub-system.

4.9.3. By using the RTPI workstations, the corresponding users will be able to generate and disseminate messages to selected PA speakers.

4.9.4. Additionally, the RTPI workstations will be used to generate and disseminate messages to selected DPIs.

4.9.5. Each workstation will include an ergonomic chair and a configurable height table.

5. Stationary Dynamic Passenger Information Displays Requirements

5.1. General Stationary Dynamic Passenger Information Display (DPID) Requirements

5.1.1. RTPI Displays will display pre-set and dynamic messages.

5.1.2. Displays will have the capability to display messages composed of any combination of alphanumeric character fonts, punctuation symbols, and full graphics.

5.1.3. Stationary DPID will be installed in the stations in a visually appealing manner.

5.1.4. The stationary DPID will be placed in a manner ensuring that it is viewable for most passengers. The displays will utilize high brightness, wide viewing angle, LCD technology.

5.1.5. Displays will be clearly legible under a full range of ambient illumination conditions at full intensity from any viewing distance within one (1) meter to fifteen (15) meters.

5.1.6. Displays will have an adequate line length to indicate the service route and predicted arrival time for a single BRT vehicle on a single line of the sign.

5.1.7. The Stationary DPID will be capable of displaying information, simultaneously and alternatively, in Urdu and English.

5.1.8. When alternating messages in two (2) languages, alternating interval will be configurable (six seconds initially).

5.1.9. By using an integrated ambient light sensor, brightness will be adjusted automatically depending on the surrounding light.

5.1.10. The Stationary DPID will be capable of broadcasting full color video entertainment, news, public service announcements, and advertisements.

5.1.11. By splitting the screen in two (2) or more areas where different content can be displayed, it will be possible to display simultaneously trip information (route, destination, next station, etc.) and news, service announcements or advertisements.

5.1.12. In order to provide passengers with a uniform customer experience, RTPI features and equipment aesthetics will be unified all along the Bus Rapid Transit system

5.1.13. The displays will be enclosed in a tamperproof casing with toughened glass. The surface of the display will be coated with an anti-glare layer to enable viewing during any time of the day.

5.2. Communications with L3 RTPI Management Center

5.2.1. Information to be displayed regarding the route, next arrivals and departures, etc. will be received using SIRI General Messaging Service. The Service Interface for Real Time Information (SIRI) or is an XML protocol to allow distributed computers to exchange real time information about public transport services and vehicles. SIRI is based on the CEN Transmodel abstract model for public transport information and comprises of a general-purpose model and an XML schema for public transport information.

5.2.2. The DPID shall support import of RTPI data per the Generic Transit Feed Specification (GTFS) and its real-time equivalent.

5.3. Station Entrance Passenger Information Display

5.3.1. Location. The station entrance passenger information display will be located near the entry gates of the station (i.e. near the security check area and the gate validators).

5.3.2. Information type. The station entrance passenger information display will provide the passenger with information on:

5.3.2.1. Platform number; and;

5.3.2.2. Estimated number of minutes prior to the arrival of each direction of each route. The display will also be capable of showing system or public announcements emanating from the station manager or the OCC.

5.3.3. Location. Each docking bay on each station platform module will be fitted with a passenger information display. A docking bay constitutes the individual stop location for a particular route. In general, a single docking bay will be offered for each direction of travel, with each direction of travel requiring a separate display. Two (2) displays are be required for each docking bay as the displays will be configured back-to-back in order to allow viewing from each end of the platform module. Terminal stops may have a single docking bay for each direction of travel. The precise location of each display will be proposed by the ITS Contractor and approved by the Employer.

5.3.4. Information type. The displays will indicate the route identifier and the actual expected departure time for at least the next three (3) BRT vehicles for each direction of travel for each route that is stopping at the particular docking bay. Up to two (2) routes may share the same docking bay. The display will also be capable of showing system or public announcements emanating from the station manager or the OCC.

For reference, the following figure illustrates a concept of the Docking Bay Passenger Information displays

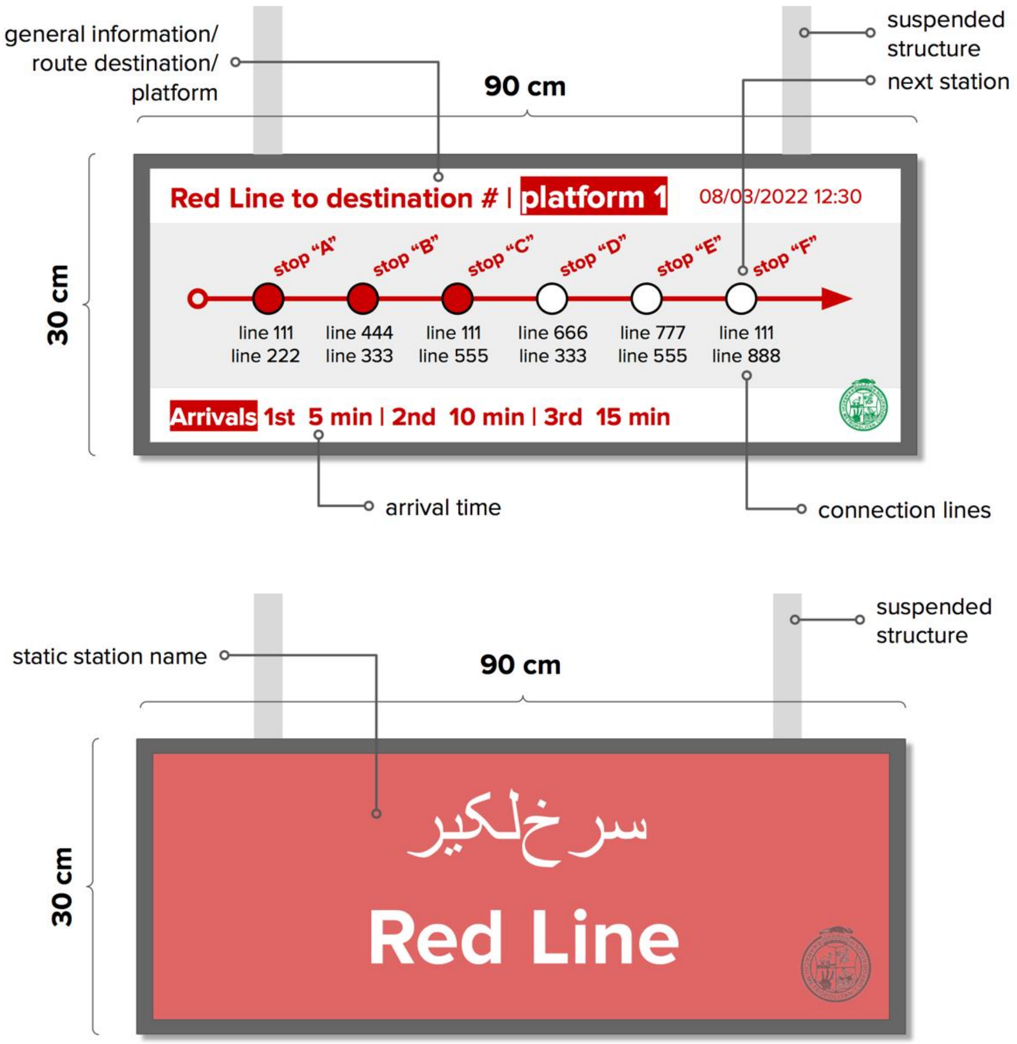

Figure 6: Concepts of Docking Bay Passenger Information displays (back-to-back)

5.4. Non-Functional ITS Requirements

5.4.1. Technical requirements for Entrance PID:

Station Entrance Dynamic Passenger Information Display	
Aspect	**Minimum requirements**
Display size/resolution	Size: 40 inch or larger Aspect ratio: 16:9
Display technology	• TFT/LCD • Display will have at least a viewing cone of equal readability at sixty-five (65) degrees on either side of a line perpendicular to the center of the mean plane of the display. • At least one thousand five hundred (1500) cd/m2 • Display Color: sixteen point seven (16.7)M • Resolution: one thousand two hundred and eighty by seven hundred and twenty (1280x720)

Station Entrance Dynamic Passenger Information Display	
Aspect	**Minimum requirements**
MTBF (mean time between failures (MTBF)	Seventy thousand (70.000) hours
Other	• Information will be readable by a person with 20/20 vision, from a distance of not less than 15 meters. • Integrated recent PC with solid state drive (SSD) memory and an up-to-date operating system • Inclusion of Ethernet port • Inclusion of protective casing and the provision of mounting in the stations • Inclusion of supporting structures to suspend displays from the ceiling

Table 1: Technical requirements for Entrance Passenger Information Displays

5.4.2. Technical Requirements for docking bay passenger information display.

Docking Bay Dynamic Passenger Information Display	
Aspect	**Minimum requirements**
Display size/resolution	• Size:30 cm x 90 cm or larger (custom resolution). • Configuration: At each docking bay location for each direction of travel, the display will be located in a two-sided configuration (i.e. allowing viewing from both ends of the platform module). • At least 1500 cd/m2 • Display Color: 16.7M • Resolution: at least 1280 x 534
MTBF	70.000 hours
Display technology	TFT/LCD Display will have a viewing cone of equal readability at sixty-five (65) degrees on either side of a line perpendicular to the center of the mean plane of the display.
Information displayed	On one side, display route and estimated time of arrival (ETA) for at least the next three (3) BRT vehicles per route for each docking bay on each platform module. A separate display is required for each direction of travel, except at terminal stations in which the same docking bay is utilized for both directions of travel. On the other side, static information showing station name.
Other	• Information will be readable by a person with twenty by twenty (20/20) vision, from a distance of not less than 20 meters. • Integrated recent PC with solid-state drive (SSD) and up-to-date operating system • Inclusion of Ethernet port • Inclusion of protective casing and the provision of mounting in the stations. • Inclusion of supporting structures to suspend displays from the celling

Table 2: Technical Requirements for Docking Bay Passenger Information Displays

6. Stationary PA Sub-System Requirements

6.1. PA Speaker Location

6.1.1. Speakers will be installed at the station entrance, near the entry gates of the station (i.e. near the security check area and the gate validators), and the bus platform waiting areas will be the main target of the PA Sub-System. A push-to-talk microphone/handset per station will be provided to enable the broadcast of local ad-hoc PA messages.

6.1.2. The location and direction of the PA speakers will be chosen with care in order for the public address messages to be clearly understood and heard throughout the platforms.

6.1.3. Speakers will be grouped into different zones by each entrance, platform and docking bay, and each zone will be separately addressed from either the Station, or from the OCC.

6.1.4. PA speakers will be installed throughout the stations ensuring that each entry, platform and docking bay is adequately covered. Public address speakers may not be dispersed more than thirty meters apart.

6.2. Public Address Speaker Information Type

6.2.1. The station PA speakers will mainly provide the passenger with information on next arrivals and departures. Moreover, paging, announcements and emergency messages will be possible. The public address system will also play announcements from the OCC at stations.

6.3. Public Address Speaker Main Features

6.3.1. The PA sub-system will implement message broadcast priority as follows: In-progress PA announcements will be pre-empted according to the following priority scheme: 1. OCC PA: Top Priority 2. Local PA via push-to-talk microphone/handset: Second Priority.

6.3.2. Fully automatic next-vehicles announcements will indicate to passengers the route name, route destination, and platform number just prior to arrival. Each announcement will start with a ‘chime’.

6.3.3. The chime sound will be programmed by the ITS Contractor to activate at a particular docking bay, at least 15 seconds prior to the arrival of the BRT vehicle.

6.3.4. The chime sound will be selected by the Employer based on options provided by the ITS Contractor. Following the chime, a high-quality digital voice announcement will be made to note the route name, route terminal point, and the platform number.

6.3.5. The voice announcement will be made in both Urdu and English. The ITS Contractor will employ a professional voice specialist (female) to deliver the recorded voice message.

6.3.6. The announcement wording will be based on the script instructions from the Employer.

6.4. PA Volume

6.4.1. The volume of the PA announcements will be adjustable to a standard level through configuration data.

6.4.2. Sound Level Adjustment: The PA system will monitor the ambient sound level at the associated station area and automatically adjust the output level of the power amplifiers. The system will also have the ability to automatically adjust the output of the system to meet day time and night time noise abatement requirements of local municipalities. The PA system will be programmed to filter out “clicking,” “pitching” and any other unsettling sounds, which may occur during use of switches, push-to-talk buttons, rotation of volume controls and other potential similar origins. The PA system will be programmed to eliminate positive feedback for all microphones used by the Public Address Sub-system. The system will be programmed to implement timed hang-up function for any sources of PA system announcements.

6.5. PA System Non-Functional Requirements

Public Address Sub-System	
Speaker	At least fourteen (14) Watt mono high quality audio
Connectivity	Ethernet – Internet Protocol (IP) speaker
Other	Power over Ethernet (PoE) will be supported

Table 3: RTPI Speakers Technical Requirements

7. On-Board External DPID Requirements

7.1. On Board External DPID Location

7.1.1. One External DPID will be installed in the top-front of the BRT vehicles.

7.1.2. One additional External DPID will be installed at the side where passengers get into the BRT vehicle. In case passengers enter the BRT vehicle from both sides, two (2) External DPID will be provided for such BRT vehicles.

7.1.3. One more External DPID will be installed at the rear of the BRT vehicle to display at least the route number.

7.2. On Board External DPID Information Type

7.2.1. By utilizing high brightness, wide viewing angle, light-emitting diode (LED) technology, the External DPID (except for the rear display) will be able to indicate three (3) types of information:

7.2.1.1. Route destination;

7.2.1.2. Name of route; and

7.2.1.3. Emergency messages.

7.3. On Board External DPID Main Features

7.3.1. During the pre-production stage, the Employer will specify the font type and the use of any branding on the DPID display.

7.3.2. The information to be displayed on the DPID will be triggered by the AVL on-board unit.

7.3.3. It will also be possible to override a message directly from the OCC under emergency conditions.

7.3.4. The display will be capable of displaying upper- and lower-case characters with proportional fonts. The displaying will be capable of showing double stroke width (bold) fonts.

7.3.5. The display will have the functionality to display messages in the following modes, set through configuration data:

7.3.5.1. A single, non-scrolling or changing message;

7.3.5.2. A right to left scrolling message; and

7.3.5.3. An alternating (between two (2) states) message.

7.3.6. The system will be designed for continuous operation without the need to manually “reboot” computers or devices.

7.3.7. Visible messages will be displayed within one (1) second after being triggered.

7.3.8. The External DPID will be capable of displaying the message in Urdu and English.

7.3.9. To avoid potential issues during cleaning daily operation, On-Board External DPID will be visible to the passengers but not installed out of the BRT vehicle enclosure.

7.3.10. External Displays will be clearly legible under a full range of ambient illumination conditions at full intensity from any viewing distance within one (1) meter to fifteen (15) meters.

7.3.11. The external display will utilize high brightness, wide viewing angle, LED technology. LED brightness will be controlled by photocells installed as part of the sign.

7.3.12. The front face of the DPID display will be designed to minimize glare.

7.3.13. On board External DPID will be equipped with a Brightness Sensor and Automatic Brightness controle

7.4. Non Functional on Board External DPID Requirements

On-Board External Dynamic Passenger Information Display	
Maximum Brightness	At least four thousand (4000) cd/m2
Minimum Viewing Angle	At least one hundred and twenty (120)º (horizontal and vertical)
Service Life	At least one hundred thousand 100,000 h

Table 4: RTPI On-board External Display Non-Functional Requirements

8. On-Board Internal DPID Requirements

8.1. On Board Internal DPID Location

8.1.1. One On-Board Internal DPID will be mounted in the front area of the BRT vehicle.

8.1.2. On-Board Internal DPID will be installed in the surroundings of each rear door, making it possible for passengers looking forward or backwards to visualize the information displayed.

8.1.3. On-board Internal DPID will be integrated into the interior layout of the vehicle in a visually appealing manner.

8.1.4. On-board Internal DPID will be mounted maximizing readability of the information displayed.

8.2. Internal DPID Information Type

8.2.1. By using high brightness, wide viewing angle and LCD technology screen, the internal DPID display will provide the following types of information to passengers:

a) Name of next station;

b) Route name and route map;

c) Route destination; and

d) Time.

8.3. Internal DPID Main Features

8.3.1. On-Board Internal DPID will utilize high brightness (at least seven hundred (700) cd/m2), wide viewing angle, liquid crystal display (LCD) technology.

8.3.2. By using an integrated ambient light sensor, brightness will be adjusted automatically depending on the surrounding light.

8.3.3. The On-board Internal DPID will be readable for up to eight (8) meters.

8.3.4. Messages on the displays will be legible during any time of day and from any designated passenger position on the bus.

8.3.5. During the pre-production stage, the Employer will specify the font type, color of the background, color of the lettering, and the use of any branding on the On-board Internal DPID display.

8.3.6. The information to be displayed will be triggered by the AVL on-board unit.

8.3.7. On-board Internal DPID will be capable of displaying information, simultaneously and alternatively, in Urdu and English

8.3.8. On-board Internal DPID will be capable to broadcast full color video entertainment, news, public service announcements, and advertisements.

8.3.9. By splitting the screen in two (2) areas where different content will be displayed, it will be possible to display on the Internal DPID simultaneously or alternatively trip (route, destination, next station, etc.)

and infotainment information (news, service announcements or advertisements). Alternatively, the Contractor may propose an alternative solution for infotainment displays for the Employer approval

8.3.10. The Contractor is responsible for the management and uploading of the content into the infotainment system. The Contractor will establish a central infotainment system from which content files are transferred to the vehicles, using the communications unit and related equipment.

8.3.11. The Contractor shall obtain or procure the content for the infotainment system. This content shall include Public service announcements, including listing of upcoming city or provincial events and any public service announcements provided by the Employer. The user content needs to be played at the vehicles according to a defined logic like time or location-based triggers. All content material shall be submitted to the Employer for prior approval.

8.3.12. For reference only, the following picture illustrates the overall expected layout of the internal On-board DPID.

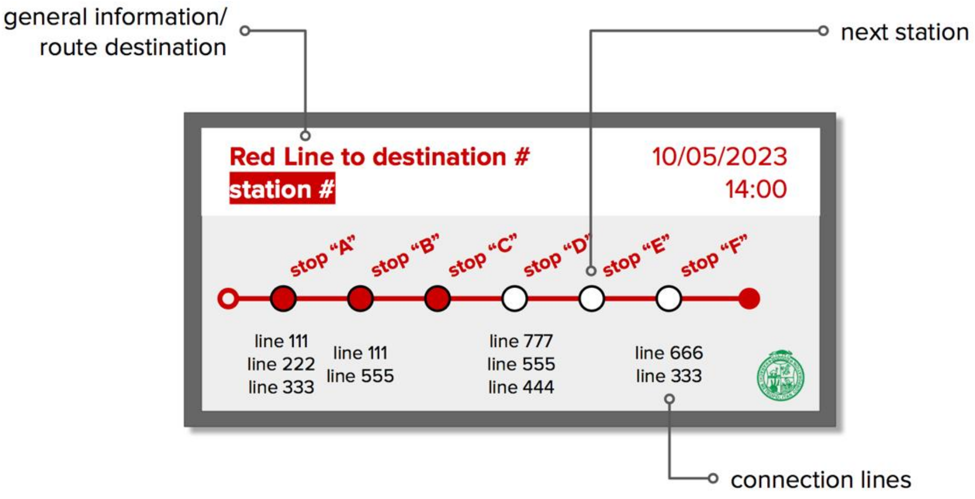

Figure 7: Overall Expected Layout of the On-Board Dynamic Passenger Information Display.

8.4. On-Board Internal DPID Non-Functional Requirements

8.4.1. The On-board Internal DPID will be enclosed in a tamperproof casing with toughened glass.

8.4.2. The surface of the display will be coated with an anti-glare layer to maximize readability during any time of the day.

8.4.3. Minimum technical requirements for the On-Board Internal DPID Information Display.

On-Board Internal Dynamic Passenger Information Display	
Aspect	**Minimum requirement**
Display size/resolution	Size: twenty-eight (28) inch or larger. Aspect ratio: 16:4-16:5 Resolution: one thousand two hundred and eighty by five hundred and thirty-four (1280 x 534) Brightness: seven hundred (700) cd/m2 View Angle: one hundred and twenty degrees (120º) (vertical and horizontal) Display Color: sixteen point seven)16.7M
Interfaces	Digital (DVI/DP/HDMI) IP/Ethernet M12 connector

On-Board Internal Dynamic Passenger Information Display	
Aspect	**Minimum requirement**
Display Technology	Thin-film-transistor liquid-crystal display (TFT)/LCD Display shall have a viewing cone of equal readability at eighty (80) degrees on either side of a line perpendicular to the center of the mean plane of the display.
Operating Temperature	As per EN 50155, T1 Class
Storage Temperature	As per EN 50155, T1 Class
MTBF (Mean Time Between Failures)	70.000h

Table 5: Technical requirements for On-Board Dynamic Passenger Information Display

9. On-Board Public Address Sub-System Requirements

9.1. On-Board PA Sub System Location

9.1.1. The BRT bus vehicle will be sufficiently covered to ensure passengers can clearly understand on-board announcements.

9.1.2. All on-board Public Address speakers will be integrated into the interior layout of the vehicle in a visually appealing manner.

9.1.3. Final location of speakers will be defined during the pre-production period.

9.1.4. The Contractor will ensure proper integration with the bus manufacturer in order to integrate adequate fixation, power, cabling and connectors.

9.2. On-Board PA Sub System Information Type

9.2.1. The station Public Address Speakers will mainly provide the passenger with information on the current location, next station and transfer options. Moreover, paging, announcements and emergency messages will be possible.

9.3. On-Board PA Sub System Main Features

9.3.1. The audio system will be capable of both digital audio messages triggered by the AVL on-board unit as well as public address messages from the driver.

9.3.2. Infotainment speakers (if separate) will be muted during public address announcements.

9.3.3. The audio system will be programmable in relation to the vehicle position in order to automatically deliver specific station information.

9.3.4. Upon arriving at a station, a digitally-recorded message will announce the station name as well as the name of possible transfer routes.

9.3.5. A digital announcement will also be made noting that the doors are opening.

9.3.6. Upon departing a station, a digitally-recorded message will note the doors are closing. The digital announcement will then note the route name, final destination, and the next station.

9.3.7. A push-to-talk microphone/handset per BRT vehicle will be provided to enable the broadcast of local ad-hoc PA messages by the driver.

9.3.8. Messages from the driver on the public address system will only occur to announce special messages or situations, such as reasons for delays or emergency instructions. The digital recording of the messages will be the responsibility of the Purchaser.

9.3.9. The system will include an automatic gain control to automatically and independently adjust interior and exterior volumes depending on interior and exterior ambient noise levels.

9.3.10. Audio public announcements will be clearly understandable for every passenger in the bus.

9.3.11. Integration with AVL system. The public address system will be integrated with the AVL system and the RTPID system to trigger the above announcements.

9.3.12. Public announcements. The PA system will also play announcements from the OCC at stations and in the BRT vehicles.

9.3.13. Technical minimum requirement: rated power twenty (20) W, maximum power thirty (30) W

9.4. Electronic Advertising Displays

9.4.1. Contractor shall install one dynamic advertising display on each pedestrian bridge to a Station in the direction of the oncoming general traffic.

9.4.2. Contractor shall provide a content management to the Employer to manage the content displayed at the displays.

9.4.3. Minimum technical requirements for the On-Board Internal DPID Information Display.

On-Board Internal Dynamic Passenger Information Display	
Aspect	**Minimum requirement**
Display size/resolutiono	Size: 8 square meter minimum, dimensions to be agreed with Employer Brightness: at least 6000 nits View Angle: one hundred and twenty degrees (120º) (vertical and horizontal) Display Color: 16.7M or more
Interfaces	Fibre optic, Gigabit Ethernet or 4G
Display Technology	Technology: THD (Through Hole Devices)
Operating Temperature	As per EN 50155, T1 Class
Storage Temperature	As per EN 50155, T1 Class
MTBF (Mean Time Between Failures)	70.000h

Table 6: Technical requirements for Electronic Advertising Display

KARACHI

BUS RAPID TRANSIT

PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 - DRAFT CONTRACTS

SYSTEM CONTROL AND SERVICE PROVIDER – SECTION 6.1.4 – SCHEDULE A – COMMUNICATIONS NETWORK

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

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1. Glossary

1.1. Abbreviations and Terms

The following abbreviations and terms are used throughout this functional/technical specification document and shall have the meaning attributed to it in this Glossary.

Please note that terms used in this document will at first be accompanied by an associated abbreviation in brackets where after the abbreviation will apply.

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
AFC	Automated Fare Collection
AMS	Asset Management System
API	Application Program Interface
AVL	Automated Vehicle Location System
AVM	Automated Vehicle Monitoring System
BRT	Bus Rapid Transport
BDMS	Bus Depot Management System
BI	Business Intelligence
BIAS	Business Intelligence and Analysis Software
BoQ	Bill of Quantities
BPM	Business Process Management
CCH	Central Clearing House
CCTV	Closed Circuit Television
CIT	Cash in Transit
COTS	Commercial of the Shelf
CSC	Contactless Smart Card
CSC Emulation	Mobile Application (emulation)

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
CST	Contactless Smart Ticket
DPI	Dynamic Passenger Information
FCMC	Fare Collection Management Center
EMV	Europay, MasterCard and Visa
ERP	Enterprise Resource Planning
GoS	Government of Sindh
GPS	Global Positioning System
GTFS	Generic Front Feed Specification
GIS	Geographic Information System
GUI	Graphical User Interface
HHM	Hand Held Machine
ISO	International Organization for Standardization
ITS	Intelligent Transport System
KMS	Key Management System
KPI	Key Performance Indicator
L0	Level 0
L1	Level 1
L2	Level 2
L3	Level 3
L4	Level 4
LAN	Local Area Network
ms	Millisecond
MS	Mobility Scheme

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
MSM	Mobility Scheme Manager
MSP	Mobility Service Provider
NFC	Near Field Communications
NTP	Notice To Proceed
OAT	Overall Acceptance Test
OCC	Operation Command & Control Centre
OBU	On Board Unit
OEM	Original Equipment Manufacturer
OFC	Optic Fiber Cable
PKI	Public Key Infrastructure
PKR	Pakistani Rupee
POS	Point of Sale
PT	Public Transport
PTA	Public Transport Authority
PTO	Public Transport Operator
RAID	Redundant Array of Independent Disks
RFID	Radio-Frequency Identification
RFP	Request for Proposal
RTI	Real Time Information
RTPI	Real Time Passenger Information
SAM	Secure Access Module
SDC	Station/Depot Computer
SMTA	Sindh Mass Transit Authority

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
TOM	Ticket Office Machine
TUM	Top Up Machine
TVM	Ticket Vending Machine
UMTS	Universal Mobile Telecommunications System
VIV	Vending, Inspection and Validation handheld device
VPN	Virtual Private Network
Contractor **(or ITS Contractor)**	The successful bidder who will enter into the Contract with the Employer to provide all Goods and Services Obligations required in terms of this Request for Proposal.
City	Karachi
Employer	Sindh Mass Transport Authority

2. Communications Network Overview

2.1. Introduction

2.1.1. An Intelligent Transportation System (ITS) is an advanced application which, without embodying intelligence as such, aims to provide innovative services relating to modes of transport management and enable passengers to be better informed and make safer, more coordinated, and 'smarter' use of transport networks.

2.1.2. The ITS equipment and software is comprised of all intelligent transportation systems (ITS) deployed at the Operational Control Center, at the BRT stations, along the corridor, at the depots, and on-board the BRT vehicles.

2.1.3. The BRT Red Line Communications Network is one of the activities and deliverables under the ITS Contractor scope of works. The ITS Contractor will be responsible for operation and management of the communications network in the Karachi BRT Red Line.

2.1.4. The successful Contractor shall provide a full-featured and well-proven Communications Network system for the BRT Red Line operations. The Contractor shall ensure integration into the ITS at the Operations and Control Center (OCC) and shall operate and maintain said system in accordance with the specifications and requirements stipulated in this Schedule.

2.2. Communications Network Main Goals

2.2.1. The Contractor shall provide a Communications Network as part of the ITS solution and in accordance with the Specifications and Requirements provided in this Schedule, and other sections in this RFP document where applicable, and shall operate and maintain such System for the duration of the Contract term.

2.2.2. The main purpose of the BRT Red Line Communications Network is to ensure consistent and reliable connectivity for the different ITS features to be supplied by the Contractor, including an optical fiber cable network (or microwave wireless transmission where optical fiber is not feasible) linking the OCC, BRT Red Line Stations and BRT Red Line Depot.

2.2.3. For this purpose, the Contractor will supply, install and maintain all necessary active and passive network components, including at least: routers, switches, cabinets, patch panels, conduits, cables, modems and antennae required for installation and operations of all ITS systems of the BRT Red Line.

2.2.4. The Contractor's key functions/responsibilities relating to the Communication Network include at least the following:

a) Perform network administration functions to ensure network availability to all ITS elements;

b) Monitor all network segments including fiber optic backbone, OCC LAN, Station LANs, Bus Depot LAN, Wi-Fi Mesh and Corridor Camera network;

c) Perform configuration of network devices including switches/routers/OADM/MuX/DeMUX and any other network components for optimal operation of the Communications Network;

d) Troubleshoot and resolve network connectivity problems in collaboration with network maintenance staff;

e) Ensure security of data and network by implementing and monitoring security policies;

f) Continuously monitor network performance to ensure reliable connectivity and protect against security threats; and

g) Resolve any network security related problems.

2.2.5. In addition, the Contractor shall perform all Services (including support services) related to the Communication Network, as required in terms of this RFP.

2.2.6. The Contractor shall allow use of the data network for other purposes upon explicit direction by the Employer (subject to capacity availability).

3. Communications Network Main Features

3.1. Major Segments of the Network

3.1.1. The Contractor will ensure the smooth operation of all elements of the Communication Network/Digital Transmission System for the Karachi BRT Red Line, by supplying all necessary active and passive network components for the operation of the Karachi BRT Red line, considering the following major network segments:

3.1.1.1. ***Backbone Communication Infrastructure***: high bandwidth optical fiber (or microwave wireless transmission where optical fiber is not feasible) will link all the main locations of the BRT Red Line: stations, along the corridors and at Bus depots with the OCC and with each other. This is the core layer of the network and will provide sufficient bandwidth for all elements of IITS to seamlessly work together. High availability and redundancy must also be the key consideration of this part of network.

3.1.1.2. ***Local Area Network (LAN) for Stationary Locations (including BRT Stations and Bus Depots and OCC)***: This part of network, based on Ethernet, will link devices such as Fare System devices, Security cameras, Ticketing Booths, RTPI devices and other IT elements within a Station with each other and to the aggregation layer above in the network hierarchy. The Contractor shall also install LAN systems in the OCC and data centre where required.

3.1.1.3. ***Link with OCC and other BRT Corridors***: The OCC houses the data center monitoring work stations, security monitoring stations, RTPI management, bus depot management and all other central elements of IITS. Contractor's backbone shall be linked to the Level 4 systems in the OCC

3.1.1.4. ***Bus to OCC Communication***: The AVL system and intelligent Bus Monitoring System require real time communication from Buses during operations to Level 3 and Level 4 OCC.

3.1.1.5. ***Corridor Camera Network***: Must link the feed from all cameras on the corridor to the OCC.

3.2. Design Features

3.2.1. The Communication Network must be designed considering the following features:

3.2.1.1. ***Resilience***: The network must provide high availability (99.999% i.e. five 9s) and the network design must include a *business continuity plan* to cater for faults and problems in the primary network;

3.2.1.2. ***Scalability***: The network design must be able to integrate with the other planned BRT corridors; and

3.2.1.3. ***Security***: The network must be resilient against security threats and data breaches and must provide security elements including firewalls, intrusion prevention systems (IPS), intrusion detection systems (IDS).

4. Communications Network Infrastructure

4.1.1. The following further requirements will be considered by the Contractor to design and supply the Communications Network infrastructure.

4.2. Final Optic Connections and Final Connectivity

4.2.1. Fiber optic communications will be established between all Stations, depots, and the OCC. A self-healing ring design will be employed to ensure redundancy.

4.2.2. Final connectivity inside the Stations to the distinct ITS elements will be provided through gigabit UTP Ethernet cabling connecting to the fiber optic backbone.

4.3. Stations Data Cabin

4.3.1. The Contractor will provide a Data Cabin in each BRT Red Line Station to host its main IT systems.

4.3.2. The optic fiber will terminate in each Station in the data cabin.

4.3.3. The Contractor shall install a 19-inch cabinet in each data cabin and a managed switch or converter inside the 19-inch server cabinet to connect to the fiber optic backbone.

4.3.4. The Contractor will ensure climate control in the data cabin and will be responsible to ensure the functioning of an air-conditioning system inside the data cabin.

4.3.5. The Contractor will provide an uninterruptible power supply capable of powering all equipment in the data cabin for at least 20 minutes (inclusive of Power-over-Ethernet (POE) connected items).

4.4. Back-Up Communications System

4.4.1. The Contractor shall provide mobile 4G (or 5G if available) mobile communications, including SIM cards, as a back-up to the fiber optic (or microwave) communications system between the different Stations, depots and OCC.

4.4.2. The back-up 4G system will act as an automated failover in case the primary communication system fails.

4.4.3. The back-up system will take over all the data communication between Stations, depots and the OCC if the primary system fails. Note that CCTV video communication is exempted from this requirement.

4.5. On-Board SIM Cards

4.5.1. 4G SIM cards, for data and voice communications on-board the BRT Red Line Vehicles, will be supplied by the ITS Contractor for the following on-board devices supplied by the BRT Vehicles Manufacturer:

a) Vehicle Communication Gateway

b) Passengers IP Wireless AP

4.5.2. 5G SIM cards will be supplied instead if the technology is available and compatible with the existing devices supplied by the BRT Vehicles Manufacturer.

4.6. Technical Requirements

4.6.1. The following table summarizes the main Communications Network technical requirements to consider by the Contractor:

Communications network on stations, depot, and Operational Control Center	
Aspect	**Minimum requirements**
Wired cabling	1000BASE-T over Cat 6 or CAT 6A cables
Power over Ethernet	May be supported to power IP CCTV cameras and VoIP telephony
Fiber optic backbone connection	• Managed switch with dual power supply • At least 4 slots for SFB transceiver modules • 2 SFB 10Gbps single mode SFB modules installed
Stations/Depot/OCC switch	• May be combined with fiber optic switch • Sufficient managed switches with dual-power supply each featuring 24 Gbit ports supporting POE.
Mobile back-up	• 4G mobile data connectivity using a private APN • 19 inch or DIN rail mounted • External antenna
Virtual LANs	At least the following separate VLANs shall be configured: • Financial; • Station management; • Voice; • CCTV video; • Other video; • RTPI; and • 3 VLANs RFU

Table 1: Technical Requirements of Communications Network

4.7. Station Wi-Fi

4.7.1. The ITS Contractor will install Wi-Fi antennae and provide public free Internet access at all Stations, ensuring that all BRT Red Line station platforms are sufficiently covered.

4.7.2. The ITS Contractor will be able to show the passengers at first connection a welcoming screen, the contents thereof to be determined by the Employer. The effective Internet capacity per Station shall exceed 10 Mbps for all portions of the platform floor.

4.7.3. Additionally, a separate private Wi-Fi network, not accessible by passengers, will be deployed at the BRT Red Line stations and Bus Depots to enable EFC handhelds communications with L2 and/or L3 management infrastructure.

4.8. UHF/VHF communication systems

4.8.1. The Contractor will provide a UHF or VHF based wireless trunked digital communications system comprising a central system to be operated from the Operational Control Center, portable units, and on-board units that are to be integrated on the vehicles.

4.8.2. The UHF/VHF system will be compliant with MPT-1327, TETRA, NXDN, APCO-25 or any other protocol meeting the requirements and providing proven vendor interoperability. The system must support unicast, multicast, and broadcast communication systems within 30 kilometers of radius.

4.8.3. The UHF/VHF system will support the following features:

a) Private call, group call, all call, emergency call

b) Digital/analogue telephone interconnect

c) High clarity. The system shall allow full duplex communications with high clarity between the control center and vehicles

4.8.4. It is up to the Contractor to obtain a frequency license from the concerned government department for the life of the contract

4.8.5. The Contractor is responsible for selecting locations for the main and repeater antennae, if any

4.8.6. Equipment requirements. The UHF/VHF system comprises the following:

a) A central system, including antenna(e)

b) Equipment for user workstations in the Operational Control Center (console, microphone, speaker)

c) Equipment for integration in buses (console, microphone, speaker, transceiver, antenna)

d) Handheld equipment, with an effective operational battery life of at least 8 hours, comprising a portable radio, carrying case, and a charging station.

5. Network Security

5.1.1. A holistic approach to network security must be taken to ensure smooth operation and data safety.

5.2. Security Requirements

5.2.1. A comprehensive security policy will be designed and implemented to ensure complete safety against all types of threat, including at least:

5.2.1.1. Application security: The software and applications running in the BRTS system must ensure network security. This is especially applicable to any applications running on mobile devices. Strict policies must be ensured for mobile devices access to the BRTS system.

5.2.1.2. Firewalls, Intrusion Prevention System (IPS), Intrusion Detection Systems (IDS) will be implemented at key network points to establish demilitarized zones (DMZ). The current state of the art network devices integrates functions of routing, IPS, IDS in a single piece of hardware.

5.2.1.3. All connection from remote sites to OCC will be implemented as VPN over either MPLS or IP. This approach not only will provide flexibility in terms of network resilience but also will offer additional security as VPN implements encrypted communication through the channel.

5.2.1.4. Network segmentation and access control will be implemented to ensure only right equipment accessing the right information.

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 - DRAFT CONTRACTS

SYSTEM CONTROL AND SERVICE PROVIDER – SECTION 6.1.5 – SCHEDULE A – SECURITY & SURVEILLANCE

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

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1. Glossary

1.1. Abbreviations and Terms

The following abbreviations and terms are used throughout this functional/technical specification document and shall have the meaning attributed to it in this Glossary.

Please note that terms used in this document will at first be accompanied by an associated abbreviation in brackets where after the abbreviation will apply.

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
AFC	Automated Fare Collection
AFMC	Automated Fare Collection Management Center
AMS	Asset Management System
API	Application Program Interface
AVL	Automated Vehicle Location System
AVM	Automated Vehicle Monitoring System
BRT	Bus Rapid Transport
BDMS	Bus Depot Management System
BI	Business Intelligence
BIAS	Business Intelligence and Analysis Software
BoQ	Bill of Quantities
BPM	Business Process Management
CCH	Central Clearing House
CCTV	Closed Circuit Television
CIT	Cash in Transit
COTS	Commercial of the Shelf
CSC	Contactless Smart Card

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
CSC Emulation	Mobile Application (emulation)
CST	Contactless Smart Ticket
DPI	Dynamic Passenger Information
EFC	Electronic Fare Collection
EMV	Europay, MasterCard and Visa
ERP	Enterprise Resource Planning
GoS	Government of Sindh
GPS	Global Positioning System
GTFS	Generic Front Feed Specification
GIS	Geographic Information System
GUI	Graphical User Interface
HHM	Hand Held Machine
ISO	International Organization for Standardization
ITS	Intelligent Transport System
KMS	Key Management System
KPI	Key Performance Indicator
L0	Level 0
L1	Level 1
L2	Level 2
L3	Level 3
L4	Level 4
LAN	Local Area Network
ms	Millisecond

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
MS	Mobility Scheme
MSM	Mobility Scheme Manager
MSP	Mobility Service Provider
NFC	Near Field Communications
NTP	Notice To Proceed
OAT	Overall Acceptance Test
OCC	Operation Command & Control Centre
OBU	On Board Unit
OEM	Original Equipment Manufacturer
OFC	Optic Fiber Cable
PKI	Public Key Infrastructure
PKR	Pakistani Rupee
POS	Point of Sale
PT	Public Transport
PTA	Public Transport Authority
PTO	Public Transport Operator
RAID	Redundant Array of Independent Disks
RFID	Radio-Frequency Identification
RFP	Request for Proposal
RTI	Real Time Information
RTPI	Real Time Passenger Information
SAM	Secure Access Module
SDC	Station/Depot Computer

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
SMTA	Sindh Mass Transit Authority
TOM	Ticket Office Machine
TUM	Top Up Machine
TVM	Ticket Vending Machine
UMTS	Universal Mobile Telecommunications System
VIV	Vending, Inspection and Validation handheld device
VPN	Virtual Private Network
Contractor **(or ITS Contractor)**	The successful bidder who will enter into the Contract with the Employer to provide all Goods and Services Obligations required in terms of this Request for Proposal.
City	Karachi
Employer	Sindh Mass Transport Authority

2. Security & Surveillance System Overview

2.1. Introduction

2.1.1. An Intelligent Transportation System (ITS) is an advanced application which, without embodying intelligence as such, aims to provide innovative services relating to modes of transport management and enable passengers to be better informed and make safer, more coordinated, and 'smarter' use of transport networks.

2.1.2. The ITS equipment and software is comprised of all intelligent transportation systems (ITS) deployed at the Operational Control Center, at the BRT stations, along the corridor, at the depots, and on-board the BRT vehicles.

2.1.3. The Security Surveillance is one of the activities and deliverables under the ITS Contractor scope of works. The ITS Contractor will be responsible for operation and management of the security services in the Karachi BRT Red Line.

2.1.4. The successful Contractor shall provide a full-featured and well-proven Security Surveillance system BRT operations. The Contractor shall ensure integration into the ITS at the Operations and Control Center (OCC) and shall operate and maintain said system in accordance with the specifications and requirements stipulated in this Schedule.

2.2. Security & Surveillance System Main Goals

2.2.1. The Contractor shall provide a Security and Surveillance System as part of the ITS solution and in accordance with the Specifications and Requirements provided in this Schedule, and other sections in this RFP document where applicable, and shall operate and maintain such System for the duration of the Contract term.

2.2.2. The Contractor shall perform all Services (including support services) related to the Security and Surveillance System as required in terms of these Specifications and Requirements.

2.2.3. The main purpose of the Safety and Security system is “to promote safety and protection of passengers, assets and personnel including considerations for ensuring data integrity” in accordance with the Specifications and Requirements stipulated in this RFP. An effectively functioning Security and Surveillance System will ensure the security of the entire BRT service and operations.

2.2.4. The objective of the Security & Surveillance system is to provide continuous safety, security and surveillance of the BRT assets including:

a) Bus Stations infrastructure and installed equipment;
b) Complete Bus route;
c) Buses;
d) Passengers;
e) Red Line Staff;
f) BRT Red Line Bus Depot.

2.2.5. The ITS Contractor key Security & Surveillance functions/responsibilities will include at least the following:

2.2.5.1. Perform security monitoring of all BRT location assets using the IP Cameras, Work Stations and OCC available infrastructure, like Video Wall;

2.2.5.2. Perform continuous video monitoring;

2.2.5.3. Perform anomalous condition monitoring using intelligent features of cameras and video surveillance software;

2.2.5.4. Report to security staff any perceived or existing threat;

2.2.5.5. Manage operation of complete IP Camera network including network, cameras and video storage systems;

2.2.5.6. Perform configuration of cameras for optimal surveillance operation;

2.2.5.7. Troubleshoot and resolve camera network connectivity problems in collaboration with network operation and maintenance staff;

2.2.5.8. Manage and operate Video storage system in OCC, at Stations, at Bus Depot and in the buses;

2.2.5.9. Ensure optimal configuration of all video storage systems;

2.2.5.10. Ensure storage of video at BRT stations, OCC, Buses and Bus Depot as per agreed storage policies;

2.2.5.11. Perform archiving as per policies agreed;

2.2.5.12. Perform video analysis and assist in forensic analysis; and

2.2.5.13. Issue security reports.

2.2.6. Contractor will integrate with the video storage system provided by (an agent of) the Employer in the OCC.

3. Closed-Circuit Television (CCTV)

3.1. Introduction

3.1.1. CCTV cameras with infrared lights will be installed inside and outside BRT Red Line stations, the BRT Red Line corridor, station platforms, access control barriers, ticket offices and TVMs.

3.1.2. The placement of security cameras will ensure round the clock surveillance for all points of interest.

3.1.3. The Contractor will provide CCTV equipment to monitor the BRT Red Line stations and corridors for purposes of:

a) Security and safety;

b) Revenue integrity; and

c) Monitoring the dispatching of personnel and/or emergency services in case of calamities.

3.1.4. The Cameras supplied by the ITS Contractor will comply at least with the following minimum features:

a) IP cameras (digital);

b) Compression options H.265, H.265+, H.264+, H.264;

c) min 120dB Wide Dynamic Range;

d) Day/Night;

e) 3D Digital Noise Reduction;

f) IR range: min 30m;

g) IP66 or above;

h) IK10; and

i) Min illumination 0.05 lux and 0 lux with IR on outdoor.

j) API for control and integration with other systems;

k) Frame rate (30fps or more);

l) Power over Ethernet (POE) (at some locations);

m) Image sensor size (1/3” or greater);

n) Day and Night auto IR cut filter;

o) Ethernet connectivity and supporting protocols;

p) Open Interface for Video management and analytics software.

3.1.5. The Cameras supplied by the ITS Contractor will include the following intelligent features as standard/built in:

a) Motion detection;

b) Tripwire detection;

c) Intrusion detection;

d) Scene change;

e) Abandoned/missing object detection;

f) Facial detection;

3.1.6. Platform door cameras supplied by the ITS Contractor will have the following intelligent features:

a) People counting; and

b) Heat mapping.

3.2. Stations CCTV

3.2.1. The Contractor shall implement the installation locations as defined in the Red Line Detailed Design for these cameras in such a way that the following areas are monitored:

a) Station Concourse, including: Access Control Barriers, TVMs and Ticket Offices;

b) Station hallways;

c) Platforms.

3.2.2. The following table summarizes the main short range CCTV Cameras specific technical requirements:

CCTV Camera (Short Range)	
Aspect	**Minimum requirements**
Resolution/frame speed	At least 1080p and 24 frames per second
Low light capabilities	IR sensitive and IR illumination
View angle	Wide
Other	• Local video storage on SD-card, at least 24 h; • Gigabit connectivity; and • Power over Ethernet may be supported and used.

Table 1: CCTV Short Range Technical Requirements

3.3. Bus Route CCTV

3.3.1. The Contractor will deliver and install long range CCTVs covering the BRT Red Line corridor.

3.3.2. *P*rimary CCTVs will be installed at the Stations, covering the corridor lanes in line of sight from the Station.

3.3.3. Secondary CCTVs will be mounted on dedicated poles or on light poles alongside the corridor.

3.3.4. The ITS Contractor shall, for purposes of power supply, integrate with light poles alongside the corridor.

3.3.5. The Contractor may use radio-frequency communications to manage the CCTVs.

3.3.6. All video feeds shall be streamed to and stored by the Video Management and Analytics system in the OCC.

3.3.7. All cameras shall always provide streaming images to the OCC at a reduced frame rate and resolution, but not lower than 15 frames per second and 720P resolution.

3.3.8. When an incident triggers an alarm, cameras shall stream video footage at maximum frame rate and resolution, which as a minimum shall be 25 frames per second and CIF resolution.

3.3.9. During the alarm state, recording shall also be at the increased frame rate and resolution. Alarm recording shall continue for a configurable time period after which it shall revert back to the lower frame rate and resolution.

3.3.10. The following table summarizes the main long range CCTV Cameras specific technical requirements:

CCTV Camera (Long Range)	
Aspect	**Minimum requirements**
Resolution/frame speed	At least 1080p and 24 frames per second
Low light capabilities	Low light/IR sensitive
Type	Pan-Tilt-Zoom (PTZ)
Lens	1x - 10x optical zoom, long range capable (up to 250 meters)
Other	• RF connectivity allowed; • Power over Ethernet may be supported and used; • Wipers; and • IP66 rating.

Table 2: CCTV Long Range Technical Requirements.

3.4. On-Board Bus Security and Surveillance System

3.4.1. IP Cameras on-board the BRT vehicles will be provided by the BRT Vehicles Manufacturer.

3.4.2. The Contractor shall provide the required components for connecting to the on-board cameras supplied by the buses manufacturer and recording the on-board cameras footage. For this purpose the ITS Contractor will provide and install onboard the buses one Digital Video Recorder (DVR) supporting at least 8 IP video cameras.

3.4.3. All CCTV footage shall be recorded onboard by the Digital Video Recorder (DVR).

3.4.1. DVR must have capability to store recording for at least four (4) days.

3.4.2. The DVR shall be connected to the AVL on-board unit for management purposes. Output from the cameras will be shown through a visual display on or near the dashboard. The driver shall have a visual digital display of the area behind the vehicle whenever the vehicle is in reverse gear.

3.4.3. Video footage on the DVR will be downloadable at the depot if required. In normal conditions, the video footage will be downloaded when the vehicle enters the depot. The ITS Contractor will design the system so the data can be readily downloaded after the vehicle enters the depot. In emergency situations, the system will allow streaming of onboard footage to the control center.

3.4.4. All the on-board IP cameras will be networked/connected to the OCC and to the Security Monitoring Desk, in such a way that video output will be integrated with the control center's hardware and software.

3.5. Stationary Video Recording

3.5.1. The ITS Contractor will be responsible for connecting to all of the cameras and provide tools to manage the security system at stationary locations (including BRT Red Line stations and BRT Red Line Depot)

3.5.2. Each stationary location will have a separate Network Video Recorder or Video Management Server and one (1) Security & Surveillance workstation for the purpose of recording, managing and displaying the video feed to the system users.

3.5.3. The server at stationary locations will comply with the minimum following requirements:

a) 64 channel,

b) 512 Mbps input rate,

c) 4 channel @4K display, 2 HDMI, VGA,

d) Storage capacity to store all CCTV feeds for 7 days,

e) 2xGbE ports, AC 180-260 V Power supply,

f) H.265+, H.265, H.264,MJPEG compression

g) Connected to the central security management system and OCC.

h) Secure communication

3.6. Video Management and Analytics System (VMAS)

3.6.1. The video recording and managing system (VMAS) at the OCC will support and provide the functionality to access, control and record all the CCTV footage captured at BRT Red Line stations, in the BRT Red Line corridor, at OCC, at the BRT Red Line Bus Depot and other cameras in the BRT Red Line.

3.6.2. The VMAS will be extended to store all video at highest resolution for at least thirty (30) days.

3.6.3. The VMAS shall be operated from the OCC. It will consist of a video wall and all the related and required equipment to effectively perform video surveillance and controlling.

4. Other Security Capabilities

4.1.1. The following additional security capabilities will be supplied by the ITS Contractor.

4.2. Handheld Metal Detectors: General and Functional Requirements

4.2.1. The Contractor will provide ergonomic handheld metal detectors complying with the following minimum requirements:

4.2.1.1. ***Detection capabilities.*** The metal detector shall be able to detect with equal precision a wide range of both ferrous and non-ferrous metallic items, from guns to small knife blades;

4.2.1.2. ***Modes***. The metal detector shall have optical, acoustic and vibratory alarm modes;

4.2.1.3. ***Sensitivity settings***. The metal detector shall support multiple sensitivity levels. Sensitivity tuning shall be automatic;

4.2.1.4. ***Charge capacity***. The metal detectors shall capable to be used continuously for 18 hours without recharging. Metal detectors shall be rechargeable. Batteries and chargers shall be included; and

4.2.1.5. ***Interference clearing***. The metal detector shall support interference clearing.

4.3. Walk-Through Metal Detectors: General and Functional Requirements

4.3.1. The Contractor will provide high-throughput walk-through stationary metal detectors complying with the following minimum requirements:

4.3.1.1. ***Detection capabilities.*** The metal detector shall be able to detect with equal precision a wide range of both ferrous and non-ferrous metallic items, from guns to small knife blades;

4.3.1.2. ***Zones.*** The metal detector shall support multiple zones. There must be separate transmitters and receivers for at least 9 zones, with freely adjustable sensitivity levels per zone;

4.3.1.3. ***Sensitivity settings.*** The metal detector shall support multiple programmable sensitivity profiles and allow the immediate reconfiguration of sensitivity levels if the threat level changes, provided that this function is only accessible to authorized persons;

4.3.1.4. **F*requencies***. The metal detector shall operate on multiple frequencies (at least 3), with automated tuning and interference clearing;

4.3.1.5. ***Feedback.*** The metal detector shall provide visible and audible feedback of detection, including ‘height on person’ localization of threats;

4.3.1.6. ***Bi-directional counter***. The metal detector shall feature a bi-directional counter;

4.3.1.7. ***Programmable***. Metal detector shall be reprogrammable but protected by at least a password; and

4.3.1.8. ***Bag search tables***. The Contractor shall provide desks or tables next to metal detectors to support searching of bags.

4.4. Security Vehicles: General and Functional Requirements

4.4.1. Contractor will provide three (3) security vehicles to be stationed at the Depots and staging areas for rapid response to Stations and corridors in case of emergency events. These vehicles will comply with the following minimum requirements:

4.4.1.1. ***Make and model***. The vehicles shall be Toyota Hilux Single Cabin 4X2 or similar with customization for security purpose or of equivalent specification. The model year shall be the most recent;

4.4.1.2. ***Technical features***. The vehicle shall be fitted with the following features:

a) Automated transmission;
b) Anti-lock braking system;
c) Vehicle immobilizer;
d) UHF/VHF communications system;
e) Air conditioning; and
f) Siren system with flashing lights on vehicle roof;

4.4.1.3. ***Branding and color***. The vehicles will be branded with the system branding. The Contractor will receive the color and design instructions from the Employer;

4.5. Street Sweeper: General, Functional and Requirements

4.5.1. The Contractor will provide a mechanical driven truck-mounted vacuum street sweeper vehicle that can sweep and collect all fine particles. The sweeper will comply with the following minimum technical specifications:

4.5.1.1. Sweeping capacity at least 20,000 m2 per hour;

4.5.1.2. Sweeping speed up to 15 km per hour;

4.5.1.3. Hopper tank capacity of at least 6 cubic meters (m^3);

4.5.1.4. Water tank capacity of at least 1,500 liters;

4.5.1.5. Sweeping width sufficient to sweep a single corridor lane in a single sweep;

4.5.1.6. The water pump supports up to 100 bars;

4.5.1.7. Adjustable pressure brushes; and

4.5.1.8. User-friendly control panel;

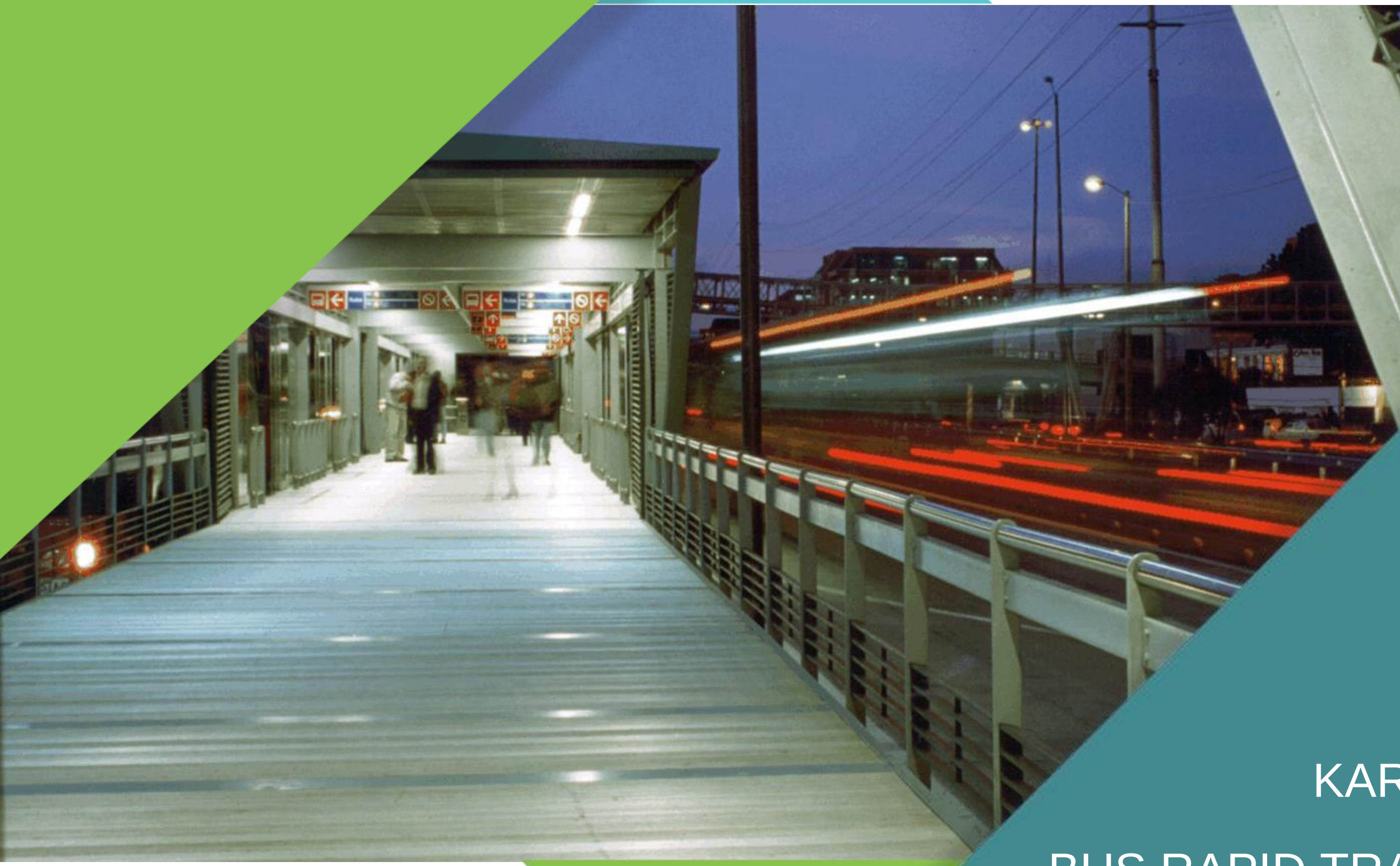
4.6. Uniforms: General Requirements

4.6.1. The Contractor will supply a pair of uniforms per employee in accordance with the designs shared by the Employer. The uniforms will form part of Station Management requirements, but also contributes to safety and security due to the visibility of staff members.

4.7. Biometric System for Attendance of Staff: General Requirements

4.7.1. The Contractor will install a Biometric System at each Station to support the management of staff attendance for staff members deployed at each Station.

4.7.2. A station-wide record will be available through an online/web-based system to the Employer at the OCC for audit and verification purposes. This System will support Station Management and Safety and Security Management functions.



KARACHI

BUS RAPID TRANSIT

PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 - DRAFT CONTRACTS

SYSTEM CONTROL AND SERVICE PROVIDER – SECTION 6.2 – SCHEDULE B - SCHEDULE OF SERVICES

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

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1. Glossary

1.1. Abbreviations and Terms

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AMS	Asset Management System
AP	Access Point
API	Application Program Interface
AVL	Automated Vehicle Location
AVM	Automated Vehicle Monitoring System
BRT	Bus Rapid Transport
BDMS	Bus Depot Management System
BI	Business Intelligence
BoQ	Bill of Quantities
CCTV	Closed Circuit Television
COTS	Commercial of the Shelf
DVR	Digital Video Recorder
DPI	Dynamic Passenger Information
EFC	Electronic Fare Collection
ERP	Enterprise Resource Planning
FMS	Fleet Management System

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
GNSS	Global Navigation Satellite System
GoS	Government of Sindh
GPS	Global Positioning System
GTFS	Generic Front Feed Specification
GIS	Geographic Information System
GUI	Graphical User Interface
ISO	International Organization for Standardization
ITS	Intelligent Transport System
KMS	Key Management System
KPI	Key Performance Indicator
L0	Level 0
L1	Level 1
L2	Level 2
L3	Level 3
L4	Level 4
LAN	Local Area Network
MADT	Multi-Application Driver Terminal
MMI	Man Machine Interface
ms	Millisecond
MSP	Mobility Service Provider
NFC	Near Field Communications
NTP	Notice To Proceed
OBU	On-Board Unit

ABBREVIATION OR TERM	DESCRIPTION OR DEFINITION
OCC	Operation Command & Control Centre
PKR	Pakistani Rupee
PT	Public Transport
PTA	Public Transport Authority
PTO	Public Transport Operator
RAID	Redundant Array of Independent Disks
RFP	Request for Proposal
RTI	Real Time Information
RTPI	Real Time Passenger Information
SAM	Secure Access Module
SDC	Station/Depot Computer
SMTA	Sindh Mass Transit Authority
VOC	Vehicle Operating Companies
Contractor (or ITS Contractor)	The successful bidder who will enter into the Contract with the Employer to provide all Goods and Services Obligations required in terms of this Request for Proposal.
City	Karachi
Employer	Sindh Mass Transport Authority

2. Services Overview

2.1. Scope

2.1.1. Services described in this schedule comprise all activities required to effectively deliver the following:

a) Fleet management services (including scheduling);
b) Passenger information management services;
c) Control Centre management services;
d) Fare management services;
e) Station management services;
f) Maintenance of equipment and software delivered under the Contract;
g) Monitoring and reporting; and
h) Provision of other services envisioned under the Contract.

2.2. Responsibilities and Obligations

2.2.1. This section describes the general contractual responsibilities and obligations to be performed and/or adhered to by the Contractor in order to fulfill the service Agreement.

2.2.2. **Responsibilities.** The Contractor is responsible to deliver the Services described in this Schedule for the duration of this Agreement. The Contractor must undertake all activities required to deliver said Services at no additional cost to the Employer, subject to the following exceptions:

The physical replacement of the system at the end of the Contract; and

Repair or replacement of systems that have been damaged by a vehicle, unless the vehicle is commissioned by or on behalf of the Contractor.

2.2.3. ***Obligations.*** The primary obligations of the Contractor are described below.

Level of service performance. The Contractor must, from Service Commencement through to the Completion of the Contract term, perform all Services according to the performance levels set out in Section 10 of this Schedule.

Service Commencement. From Service Commencement, the Contractor is required to perform at least the Station Management Services, as per the Agreed and Finalized Project Plan and in accordance with the Station Safety and Station Management KPIs stipulated in Section 10 of this Schedule.

Management Plan and Monitoring System. The Contractor must develop a suitable and adequate management plan and monitoring system. The Contractor is required to effectively observe and monitor operations.

Maintenance. During the contract Term the Contractor is solely responsible for all maintenance repairs and replacements in respect of the following, delivered under the Contract:

a) All ITS system equipment and software;
b) BRT station equipment and facilities;

c) busway corridor components; and

Maintenance repairs and replacements must be performed in accordance with the Original Equipment Manufacturer (OEM) specifications (where applicable) and with due regard to the prevailing international standards.

The Contractor must take all steps to procure goods and services necessary to ensure the due, proper, and timely discharge of all the preventive maintenance obligations prescribed from time-to-time by the supplier specifications.

Excluded from the above maintenance requirement are Components under the maintenance regime of third-party entities contracted separately by the Contractor are excluded from the above maintenance requirement and include the following:

a) The automatic station doors;

b) Elevators and escalators:

c) Station power generators;

d) Busway entry gates;

e) Pedestrian bridges and tunnels; and

f) The busway pavement, and delineator curbs.

Maintenance of Supplemental Equipment and Software. The Contractor must provide, install, and maintain supplemental equipment and software for the ITS and Station Management to or for the Employer or any person/entity designated by the Employer e.g. a Vehicle Operating Company (VOC), at the prices and subject to the conditions stipulated in *Schedule C - Additional Components Price Sheet*.

Operational and Maintenance Staffing. The Contractor must appoint a suitable number of resources with the necessary skills, knowledge, experience, and qualifications to ensure that the Contractor is and remains able to discharge all its operational and maintenance obligations in terms of this Agreement timeously and effectively and must ensure, at its sole cost and expense, that all its operational and maintenance personnel undergo the necessary ongoing training and/or instructions and evaluations to ensure compliance with this Schedule.

Conformance to Local, Provincial, and National Laws. The Contractor must in the performance of all of its obligations and responsibilities, abide by all the laws of the jurisdiction, in particular the labor laws in relation to those who are employed by the Contractor.

3. Fleet Management Services

3.1.1. ***Roles and Responsibilities***. During day-to-day operations, the Contractor must monitor the performance of the BRT fleet (e.g. adherence to schedule), give instructions (through AVL On-Board Unit and voice communications, as required) to drivers to optimize operations, and respond optimally to any incidents that negatively impact on operations. The Contractor must maintain close communications with the VOCs to ensure coordination and adherence to the schedule.

3.1.2. ***Personnel***. The Contractor must appoint a senior and experienced Fleet Management Specialist who will be responsible to ensure that the BRT services are operated in accordance with the Master Timetable and able to act on deviations of services from the Dispatch Schedule and Headway Targets. The Fleet Management Specialist is responsible for ensuring effective management of the system in line with the Employer's control objectives.

3.1.3. ***Hours of Operation***. The Contractor must provide full fleet management services during all BRT system operating hours.

3.1.4. ***Prioritization***. The required fleet control objectives to be achieved are as set out below in order of priority, starting with highest priority:

a) Provide for the safety of passengers and other road-users;

b) Provide and improve convenience to passengers;

c) Ensure vehicles arrive at and depart from stations in accordance with the Headway Schedule, as determined by the Employer;

d) Maximize the system's profitability;

e) Minimize the number of affected passengers and BRT vehicles in the event of disturbances and irregularities; and

f) Minimize the extent of the impact and duration of such impact on said affected passengers, in relation to the total number of passengers affected.

3.1.5. ***Schedule Deviations.*** The Contractor may only deviate from the above order of priority in fulfilling the Master Timetable after approval from the Employer, provided that the Employer responds within five minutes after receipt of the request for approval. It is therefore a requirement that an officer from the Employer shall always be available during operating hours (either in the Operations Control Center or telephonically).

3.1.6. ***Information Sources***. The Contractor must, after consulting with the Employer, consider all relevant input that could contribute to optimize the control of the BRT system. These inputs include messages and/or information received from bus drivers, CCTV surveillance personnel, and station personnel.

3.1.7. ***Master Timetable.*** The Contractor is responsible for implementing the Master Timetable. This shall include developing the Dispatch Schedule and the Headway Targets for the BRT vehicles and must be developed based on the core principals of optimum efficiency and customer service. The Contractor is required to participate in a consensus-based process to finalize the Master Timetable and to ensure the involvement and approval of the Employer and the respective Vehicle Operating Companies (VOCs) prior to finalization. The Dispatch Timetable and the Headway Targets must be set for each of the VOCs.

3.1.8. ***Roles and Responsibilities***. The Contractor and the Employer must jointly establish a regular program for updating the Master Timetable, based upon the most up to date available passenger demand

and system profitability information. During day-to-day operations, and in cooperation with the VOCs, the Contractor must monitor the performance of the BRT fleet (e.g. adherence to schedule), give instructions to drivers to optimize operations, and respond optimally to incidents that negatively affect the operations. VOCs must carry out the BRT services in accordance with the instructions issued by the Contractor and in accordance with the Master Timetable, on conditions that the Master Timetable does not call for the utilization of a number of BRT vehicles, which number exceeds the total number of BRT vehicles available.

3.1.9. ***Timetable Personnel***. The Contractor must appoint personnel that will be responsible for development of the Master Timetable. The Employer must also appoint, prior to completion of the Master Timetable, a senior and experienced resource to provide input and instructions in the development and management of Master Timetable.

3.1.10. ***Hours of Operation.*** Passenger service operations must be conducted during the period between 5:00 am and 12:00am each day (operating hours) and operations may not exceed this period.

3.1.11. ***Changes to Master Timetable.*** The Employer may at any time serve a notice which:

Specifies the date or range of dates on which a Master Timetable change will take effect, which date or range of dates must be reasonable, considering the nature of the Master Timetable Change and its likely impact on operations and VOCs.

4. Passenger Information Management

4.1.1. ***Roles and Responsibilities.*** The Contractor must ensure that real-time passenger information is available and displayed on passenger information displays onboard BRT vehicles and at stations. The Contractor is responsible to generate and provide the real-time information, which shall be the actual, real-time arrival times of the BRT vehicles. The Contractor is responsible to send the information to the appropriate display locations and must ensure that the information is readily and easily legible and understandable to the passenger. The Contractor is also required to generate and distribute this information through an open Application Program Interface (API) for integration by third-party entities.

4.1.2. ***Hours of Operation.*** The Real-time Passenger Information System (RTPI) must be available during all operating hours of the BRT system.

4.1.3. ***Information Sources***. The RTPI will be informed by updates received from controllers regarding deviations from the Dispatch and Headway Schedules and other information relevant to passengers.

4.1.4. ***Display Updates***. It is required that the RTPI displays must be updated as soon as reasonably possible after receiving new or updated information.

4.1.5. ***Integration with Public Address System.*** The RTPI must integrate with the station public address system to inform passengers of vehicle arrivals (through chime system), deviations, delays, arrivals, and emergency announcements. The Contractor must program the public address system to generate a chime sound at each docking bay just prior to the arrival of a BRT vehicle.

4.1.6. ***Information Sharing Outlets.*** The current vehicle arrival schedule and other data outputs of the RTPI shall be made available through the website, applications, and through an API accessible to any competent third party. The API must follow and comply with specifications of the Generic Transit Feed Specification (GTFS).

5. Control Center Management

5.1.1. ***Equipment and software maintenance.*** The Contractor must maintain the control center equipment and software at a quality level that would ensure the full availability of the equipment and software functions. In this instance, Control center equipment and software includes all equipment related to the Operations Control Center (OCC) work stations and wall display screens, passenger information systems, call center work stations and telecommunications systems, and security surveillance work stations and wall displays.

5.1.2. ***Integration.*** The Contractor must ensure that all aspects of the management and control functions within the OCC are fully integrated.

5.1.3. ***Display.*** The Contractor must operate the large screen control panels at the OCC in a way that will ensure that the real-time views do in fact enhance decision making and emergency response measures.

6. Fare Management Services

6.1. Scope and Due Diligence

6.1.1. The Fare System Services that must be performed include all activities required to operate and manage the collection and validation of passenger fare revenues.

6.1.2. ***Scope.*** The Contractor must provide the following services in the delivery of Fare System Services:

a) Fare collection; and
b) Fare validation.

6.1.3. ***Due diligence***. The Contractor must exercise the highest degree of skill, care and diligence in the provision of the Fare System Services and operate the Fare System strictly in accordance with the provisions of this Contract, to the satisfaction of the Employer, and in accordance with the standards normally expected of a Fare System service provider. The Contractor must comply with and strictly adhere to the Employer’s instructions and directions regarding the operation of the Fare System services, given from time to time. The Contractor must take instructions and directions only from a Representative of the Employer.

6.2. Fare Collection

6.2.1. ***Sales of fare media***. The Contractor is responsible for fare collection through:

a) Valid fare media; and
b) Management of fare media and products sales.

6.2.2. ***Sales points.*** Fare media will be offered for at station fare kiosks, Fare Vending Machines, and third-party agents. Fare products sales (including topping-up of stored value services) will be available at the same outlets as well as through the public transportation website and mobile applications. Single-use fare media must be available at and sold:

a) by Contractor personnel at station kiosks;
b) by Contractor conductors during operations on the off-corridor segments.

6.2.3. ***Availability.*** The Contractor must guarantee the availability of these sales services required for access to the BRT system during operating hours. Should any Passenger for any reason attributable to the Contractor, not be able to acquire fare media or add stored value or procure a single-use fare card, the customer must be allowed to enter the BRT system free of charge, and the Contractor will be responsible for an amount equal to the fare amount lost as a result of this, calculated on the full tariff in force. The Contractor must guarantee that its personnel at every station will have sufficient stock of fare media to attend to the reasonable demands of passengers using the BRT system during BRT operational hours. The Contractor will be responsible to provide all required points-of-sale and Ticket Vending Machines, stocked with sufficient banknotes and coins of all denominations sufficient to provide passengers with the correct change.

6.2.4. ***Fare policy and pricing***. The Employer will determine the fare media structure and price, which may vary from time to time. The Contractor must sell fare media to passengers at the price determined by Employer marked up with no more than PKR 5.

6.2.5. ***Personnel.*** The Contractor must ensure that the points-of-sale (station fare kiosks) at all stations are staffed with sufficient trained personnel to provide services to passengers during all operating hours. The number of personnel and their associated skill requirements must be sufficient to provide the required services, including the following:

a) Fare media registration and deregistration;

b) Fare media personalisation;

c) Lost and stolen fare media processes;

d) Fare media sales (contactless smart cards and single-use fare media);

e) Stored-value top-up sales;

f) Complaint registration and follow-up;

g) Registration and handling of passenger claims resulting from fare media errors;

h) Customer service enquiries related to fares, products, use of fare media, equipment, top-up methods, etc.; and

i) Potential partial refunds of stored value in case of BRT service malfunctions.

6.2.6. Customer communications

Customer service and communications training. The Contractor must put in place customer service and communication training to ensure customer service excellence in all instances where interaction between customers and/or passengers and Fare System personnel take place. Staff must be trained to respond to all customer and/or passenger requests in a timely, friendly, and helpful manner.

Second-line customer services. The Contractor must ensure that a second-line customer service option is available to manage complex requests and services. Second-line customer services may include a call center and/or website.

Receipts and account summary. The Contractor must be able to provide a printed fare payment receipt or a printed account summary (i.e. overview of account balance and previous trips undertaken by customer) if so requested by the customer. The Contractor must ensure that customers can access their personal account summaries via the system website.

Communicating fare system outages. The Contractor must inform the Employer and collaborate with the Employer when communication within the Fare System is interrupted or disturbed. It is the responsibility of the Contractor to inform customers of any problems experienced with the Fare System, prior to the receipt of payment from such customers. The Contractor must use the public announcement system available at stations to communicate any fare system issues at every station.

6.2.7. ***Smart card registration.*** The Contractor is responsible for initializing, personalizing, and distributing the fare media. The Contractor must register or manage registration of fare media at the prices prescribed by the Employer. The Contractor must also implement processes prescribed by the Employer to register customers for receipt of smart cards and for managing the card registration process through each of the sales channels. Revenue deposits for cards procured by the Employer must be deposited in the account designated for this purpose.

6.2.8. ***Customer account management.*** The Contractor must manage the accounts of each customer and respond effectively to customer enquiries regarding the status of their accounts.

6.2.9. ***Revenue management***. The Contractor is responsible for the collection, secure management, and transfer of all fare revenues into the system from each of the following sources:

Cash sales. The Contractor is responsible for the collection of all cash revenues generated through cash sales. Cash payments for fare media must be received by Contractor personnel at the station kiosks, at the station Fare Vending Machines, and through on-board transactions with single-use fare media. The Contractor must always ensure the security of cash collected, from the moment the payment is received from the customer until the revenues are transferred to the account of the Fund Management Company. The Contractor shall be responsible for collecting customer payments, counting the collected cash, storing and securing the cash, transporting the cash to the Contractor's bank, and depositing the cash in the Contractor's account. The Contractor is responsible to transfer the funds to the Fund Management Company account. The Contractor is fully responsible and accountable for any cash lost or stolen while under the purview of the Contractor (i.e. from receipt of the customer payment until transfer of funds to Fund Management Company account.

Credit/debit card sales. The Contractor is responsible for the collection, verification, and transfer of customer payments by credit card or debit card. Sales through credit or debit cards may take place at the station kiosks or Ticket Vending Machines and/or on-line app. On-board sales of single-use fare media shall be done on a cash basis only.

Third-party sales. The Contractor must implement an additional service network for fare media sales and stored-value sales, and under its own responsibility and for its own account. The Contractor must manage and collect all revenues from the third-party sales entities. The Contractor must establish the procedures for the transfer of these revenues from the third-party sales entities to the account of the Contractor. This network of load agents must at least comprise all mobile money providers active in Pakistan with a market share in mobile money services of 5% or more. All merchant fees must be for the account of the Contractor.

6.2.10. Revenue protection

Validation of sales and revenues. The Contractor must ensure that all sales and revenues generated are registered at each point-of-sale, in a manner that will enable the Contractor to reconcile sales and revenue per operator shift.

Revenue storage and transport. The Contractor must ensure the secure storage and transport of cash collected at the stations.

Preventing illicit revenue losses. The Contractor must introduce and/or install and operate systems, methods, and processes to prevent, detect, and recover losses caused by malicious intent, e.g. passengers evading fares and insider fraud) and system failures.

Revenue reporting. The Contractor must on a daily basis, report all stored-value sales and single-use fare sales as registered by the fare system equipment and software as per Schedule E - Prefunded Account, to the Employer.

6.2.11. Fare Validation

Personnel. The Contractor must ensure the availability of 2 (two) shifts, each consisting of up to 16 (sixteen) male conductors for an operational period of 16 (sixteen) hours to perform off-board conductor services (validation, sales, security check) at high-volume stops (i.e. stops anticipated to have a dwell-time of more than 30 (thirty) seconds, based on historical data and augmented with any further expectations). In the event that there are more than 16 (sixteen) high-volume stops, then the 16 (sixteen) stops with the highest dwell time will be selected. All conductors not required to perform off-board services, shall be part of these roving inspection teams that perform off-corridor inspections on BRT vehicles. If the services referred to in this section need to be increased or decreased, the payments to the Contractor shall be adjusted accordingly with 130% (one hundred and thirty percent) of the legal minimum salary per conductor employed by the Contractor, per shift. The Contractor shall employ 8 (eight) teams of at least 2 (two) inspectors to perform roving inspections of travel rights off-corridor and to act as security personnel on-corridor during operating hours. If such services need to be increase, decreased, or eliminated, the payments to Contractor shall be adjusted with 130% (one hundred and thirty percent) of the legal minimum salary per conductor employed by the Contractor, per shift.

Refusal of passenger entry. The Contractor may refuse a passenger entry to a station or BRT vehicle if one or more of the following apply:

a) Safe capacity of the station or BRT vehicle will be exceeded should the passenger who wishes to enter, be allowed to do so;

b) Passenger refuses to pay or cannot pay the fare required to enter the paid area of the station or BRT vehicle;

c) Passenger does not comply with the security and safety regulations or does not cooperate with Contractor personnel in order to comply with the security and safety regulations;

d) Passenger exhibits violent or otherwise offensive conduct towards Contractor personnel or other passengers; and

e) Occurrence of other reasons stipulated in applicable road traffic legislation.

7. Station Management Services

7.1. Scope

7.1.1. Station Management Services refer to services required to operate, manage, and control the BRT station environment. The Contractor must provide the following Station Management Services:

a) Passenger services;

b) Security;

c) Cleaning and landscaping; and

d) Reporting of faults, incidents, and emergencies.

7.2. Passenger Services

7.2.1. Passenger assistance

System information. The Contractor must provide sufficiently trained personnel to provide passengers with information and assistance regarding various aspects of the BRT system, including but not limited to:

a. Use of the BRT system in general;

b. Use of the Fare System;

c. Location and access to routes, stations and stops, and specific destinations near stations; and

d. Transport integration e.g. links to other transport services such as rail and feeder services.

Customer complaints and feedback. The Contractor must establish procedures and mechanisms to facilitate and support easy and convenient lodging of customer complaints and customer feedback.

Public address system. Contractor station personnel must effectively manage the public address (PA) system and announcement of local messages, which will include messages regarding system operations, station security, and public service information.

Station Wi-Fi. The Contractor must ensure the availability of free Wi-Fi at all platforms that is sufficient to allow passengers to connect to the Internet. The Wi-Fi connection must be interoperable with the Wi-Fi available on BRT vehicles. To achieve this, the Contractor is required to provide VOCs with data SIM cards linked to a continuing data contract for installation and use in the BRT vehicle fleet.

Queue and seating management. The Contractor is responsible for managing queues at stations and for ensuring the proper use of preferential seating. These responsibilities include:

a) Queue management including remedial actions for queuing at automatic gates, Ticket Vending Machines, and manual fare sales locations for the purpose of minimizing queuing time;

b) Management of boarding and alighting passenger flows to minimize the time each BRT vehicle spends at the station or stop; and

c) Management of seating priority in the vehicles for women and special needs passengers (e.g. passengers with physical disabilities).

First aid and emergency management. The Contractor must be equipped to provide first aid and emergency services to passengers making use of and personnel of the BRT system. Contractor personnel must be trained to provide first responder first aid treatment to passengers and personnel. Designated Contractor personnel must be trained in fire response actions, including evacuation procedures and fire-fighting skills.

Lost and found. The Contractor must establish a system/process to effectively manage the recovery and safe storage of articles found at stations and in BRT vehicles where owner details of such items are unknown, and for returning such items to the rightful owners.

d) The Contractor must set up a Lost and Found Center and collection point to serve as the single contact point for members of the public to enquire about lost property and items. Lost property found on BRT vehicles must also be handed to station personnel who must hand these items the Lost and Found Center.

e) The Contractor must take reasonable steps to contact owners of lost property and to ensure that any person claiming to be the rightful owner of an item is in fact the rightful owner or a person who has a right to claim such property.

f) The Contractor must provide safe storage for lost property for a period of no less than 3 (three) months. Any lost property not claimed or returned to its owner after said 3-month period must be handed over to the Employer, or, upon receipt of a written instruction from the Employer, disposed of by the Contractor.

7.3. Security

7.3.1. Scope and assignment of responsibility

Scope. The Contractor is, for the duration of the Contract, responsible for the security of all stations and the BRT corridor during station operating and non-operating hours. To achieve this, the Contractor must take all steps reasonably necessary to protect the stations, including all equipment and software at stations. The Contractor's responsibility regarding Security also includes all physical assets of the Employer handed over to the Contractor against the risks of *inter alia* fire, flood, theft, sabotage, vandalism, political riot, insurrection or terrorism, accident and physical damage to or destruction of the systems, and other physical assets of the Employer and Contractor.

Assignment of responsibilities. Responsibility regarding damage or injury to persons at stations and on vehicles, or to property belonging to persons at stations and on vehicles, shall be as follows:

a) Damage or injury caused by the Contractor or persons who the Contractor is responsible for: Contractor is responsible;

b) Damage or injury is caused by third parties e.g. vandals/other passengers: Contractor is responsible; and

c) Damage or injury is caused by Employer personnel or persons who Employer is responsible for, including the BRT VOCs: Employer is responsible.

Confidentiality. The Contractor must develop and implement mechanisms and means to ensure the adequate protection of the privacy and confidentiality of all data and confidential information pertaining to the security plans, in relation to this Contract or the security services.

7.3.2. Personnel

Code of conduct. The Contractor must prepare and implement a code of conduct for each personnel member deployed at stations and must prior to such implementation, obtain the approval of the Employer for the code of conduct.

Training. The Contractor must ensure that its security personnel are adequately trained, instructed, supervised, and disciplined to provide the required security services as well as fire-fighting and emergency procedures. The Contractor must develop and implement a code of conduct for the security personnel, subject to the approval of this code of conduct by the Employer. The Contractor is responsible for all acts performed by personnel engaged by the Contractor which acts include violations committed at stations and onboard BRT vehicles.

Regulatory compliance. Security personnel must comply with all applicable relevant legislation and regulation regarding the provision of private security services.

Background checks. The Contractor must provide all information required by the Employer to facilitate background checks/security clearance of all Contractor personnel by the related Government agencies. The Contractor shall also conduct its own due diligence when hiring personnel for BRT systems.

Uniforms. The Contractor must ensure that every security personnel member wears a clean and well-kept uniform at all times.

7.3.3. Station and corridor access control

Station security check. The Contractor must provide dedicated security personnel to perform security inspections on passengers before passengers enter the paid area of the stations. The security inspection must include the operation and management of the walk-through metal detector, performing physical and visual inspections of bags and other carry-on items, and performing a pat-down screening, if necessary.

Off-corridor security check. The Contractor is responsible to perform security checks on all passengers who enter the system by way of an off-corridor bus. These security checks must include as a minimum the use of a handheld metal detector on each passenger and performing a bag check prior to the passenger entering the BRT vehicle. One male and one female security personnel member must be present on each BRT bus.

Prevention of fare evasion. The Contractor is directly responsible for prevention of fare evasion at stations, including fare evasion at station entrances, over station fences, over or through automatic gates, or through any other openings at a station. Only validated passengers must be permitted to enter the paid area of stations, on-corridor and off-corridor BRT vehicles. Contractor must ensure that its personnel take appropriate action in the event of fare evasion or other behavior that contravenes the Employer’s conditions, and may hand suspects over to law enforcement officials, subject to agreement between the Employer and Law Enforcement. The Contractor must be ready to implement standard procedures to be followed in all instances where automatic gates fail to operate correctly due to a power failure, system malfunction, breakage of parts or any other reason, subject to review and approval of these procedures by the Employer.

Station and Platform security. Security personnel must establish and provide security presence and surveillance at the station platform areas. The Contractor through its platform security team is responsible to address and manage issues such as:

a) ***Vagrants and pickpockets.*** The presence of vagrants and pickpockets in and around the stations must be prevented and effectively managed;

b) ***Vehicle over-crowding.*** Passengers must be prevented from boarding a BRT vehicle if the vehicle is filled to its legal capacity; and

c) ***Crowd control.*** Crowd control measures including evacuation plans must be in place and implemented when unsafe platform conditions are imminent and/or present. The Contractor must enact these emergency procedures to ensure the safe evacuation of stations, whenever necessary.

Corridor access control. The Contractor is responsible to prevent private vehicles entering the corridor by effectively managing and operating the entry gates at those points where off-corridor services enter the corridor. The Contractor must ensure that armed security personnel are appointed to provide 24 (twenty-four)-hour security at these entry points.

Staff access control. The Contractor must manage and control access of duly-authorized representatives from contractors and personnel, to the equipment rooms. This requirement includes maintaining a record of access according to protocols issued by the Employer as amended from time to time.

Station opening and closing. The Contractor must ensure that all relevant stations are unlocked, prepared and are ready for service at least 15 (fifteen) minutes prior to the arrival of the first BRT vehicle due to arrive at a given station. The Contractor must ensure that the station is locked and secured after the last service for the day has been completed and preparations for the next day have been executed. The Contractor is responsible to turn the following equipment on and off daily: station lights, corridor lights, fans, and other electrical/electronic equipment, including electric motors and water coolers.

Security hours. It is the Contractor's responsibility to ensure that all stations are appropriately guarded inside and outside operating hours. .

7.3.4. ***CCTV surveillance.*** Contractor CCTV security operators in the OCC must monitor the stations and corridor through the CCTV system, to detect security anomalies. In case of anomalies, the stations and relevant authorities must be notified to take the appropriate action. The Contractor must develop security response protocols and train its personnel to understand these protocols, enabling personnel to respond appropriately in every situation.

7.3.5. **Rapid response teams**. The Contractor must establish and operate armed rapid response teams to address major security incidents at any location in the BRT system. Specific performance requirements for these teams are provided below.

Response times and daily coverage. Rapid response vehicles must be dispatched within ten minutes of receiving a request to do so from the OCC and move to the location of the emergency. These teams must be available on standby for 24 (twenty-four) hours every day. The teams must also be dispatched to situations where pedestrians and/or vehicles have illegally entered the corridor and are responsible to patrol the corridors at night.

Number of teams and location. For every 24-hour cycle, 3 (three) active rapid response teams, each consisting of 2 (two) team members, must be operating. These teams must be posted at locations along the corridor as agreed with the Employer:

Rapid response vehicles. Team members must be equipped with and operate special Sport Utility Vehicles (SUVs) to ensure rapid dispatch of a team to locations where a security incident is underway.

Costs. The Contractor is responsible for all costs associated with the operation of the rapid response teams, including the maintenance and operational costs of the SUVs.

Weapons. The Contractor is responsible to manage and facilitate the purchase and licensing of each weapon carried by each team member of the rapid response team.

Training. The Contractor must provide the rapid response team members with comprehensive training on:

a) Security response measures;
b) Weapon usage and management;
c) Crowd management; and,
d) First aid.

7.3.6. Safety

Scope. The Contractor must at all times take all steps reasonably necessary to prevent personal injury or death and loss of property or damage to:

a) Members of the public;
b) Passengers entering and exiting stations; and
c) All personnel, agents, and contractors of the Employer and VOCs.

Safety plan. Contractor must develop and implement a passenger safety plan. The passenger safety plan must be submitted to the Employer for review and approval prior to its implementation.

Emergency procedures. The Contractor must respond to any emergencies in accordance with the established emergency procedures agreed between the Contractor and Employer, as supplemented through protocols from time to time.

Monitoring of public events. The Contractor must monitor and provide information regarding public events and/or other activities taking place in the BRT geographic area that may affect BRT vehicle operations and/or safety.

Removal of obstacles. The Contractor must ensure that all obstacles on the corridor that impact or may impact the safety of BRT operations are immediately removed, within the required response time of 15 (fifteen) minutes.

Reporting of emergencies. All emergencies and other security incidents taking place at stations and on the corridor must be reported to the OCC. Record of all such reported emergencies and incidents must be kept. The OCC must log and track such emergencies and incidents and execute appropriate response measures such as notifying law enforcement agencies and/or emergency services. In addition, Contractor station personnel must be trained to identify and respond appropriately to any given situation, which response may include directly contacting the appropriate law enforcement agencies and/or emergency services.

Reporting of criminal activity. In all instances where a person is suspected of engaging in criminal activity or has violated the code of conduct, the Contractor must detain, hold, and hand such person over to the Police, launch an application for a First Information Report (FIR) against the suspected criminal or the crime, and follow up on the incident. The Contractor is responsible to enforce the code of conduct for passengers issued by the Employer, and impose and collect fines, if so authorized.

Communications system. In addition to the primary communication system, the Contractor must provide for a secondary (back-up) communication system consisting of devices such as mobile telephones and

UHF/VHF handhelds. These devices must allow Contractor personnel at stations and/or at stops to communicate effectively with each other, law enforcement personnel and emergency services whenever the primary communication system is not operational. The Contractor must ensure the communication system is operational 24 (twenty-four) hours a day, 365 (three hundred and sixty-five) days of the year. Any problems experienced with the secondary communication system must be reported to the OCC immediately.

7.4. Cleaning and Landscaping

7.4.1. ***Scope***. The Contractor is responsible for the cleaning and upkeep of stations and the busway corridor. The Contractor must also provide on-going landscaping support for the duration of the Contract to ensure the station and corridor greenery is well-maintained.

7.4.2. Personnel

Training. The Contractor must ensure that a sufficient number of personnel that are adequately trained in the use of cleaning equipment, cleaning materials and in all relevant cleaning procedures and safety precautions that may apply, are employed to perform cleaning services.

Regulatory compliance. The Contractor must ensure that cleaning personnel comply with all relevant regulatory requirements, laws and procedures, and that all the necessary safety signage is utilized during cleaning operations.

7.4.3. **Supplies**. The Contractor shall be responsible to procure the necessary janitorial, cleaning, and landscaping supplies.

Cleaning supplies. The Contractor must provide all equipment and materials required to clean the stations, consisting of the platforms, pedestrian bridges/ramps, facilities areas, toilets, bike parking spaces and others. Equipment and materials may include industrial-type vacuum cleaners, carpet cleaners, auto-scrubbers, machine sweepers and multi-speed burnishers, hose pipes, mops, brooms, buckets, janitor trolleys, ladders, industrial cleaning chemicals, and personal protective clothing (including face masks and gloves) where required.

Landscaping supplies. The Contractor must provide all equipment and supplies required to perform landscaping services, which may include fertilizer, water hoses, shovels and spades, pruning shears, garden hoses, soil knives, and rakes.

Non-damaging usage. The Contractor must ensure that the cleaning equipment and materials procured and methods utilized are not abrasive or detrimental to any of the work area surfaces in any way.

Storage of supplies. All cleaning equipment shall be stored and secured in a locked location when not in use. The Contractor is responsible to ensure that no cleaning equipment is left unattended in public spaces.

7.4.4. **Station cleaning**. Contractor cleaning personnel are responsible for the cleaning of the stations, including platforms, facilities areas, pedestrian bridges, ramps, underpasses etc. during each operational day. Cleaning services will include the activities detail below.

Basic cleaning, which includes but is not limited to:

a) Picking up litter inside station boundaries within 20 (twenty) minutes of littering taking place;

b) Dry wiping of all surfaces and cleaning of glass surfaces;

c) Sweeping and mopping of floors; and
d) Regular daily drying of wet floor space inside the station.

Sanitizing glass doors, automatic gates, and surfaces regularly and/or constantly touched by passengers.

Cleaning of toilets, providing overall toilet safety, replenishing consumables inside toilets (toilet paper, paper towels, liquid soap, toilet disinfectant etc.), and regular emptying and cleaning of all bins within the station environment. Bins must be emptied and cleaned before they are completely full.

Cleaning of platform sliding doors, escalators, and elevators (external surfaces only).

Maintaining an overall neat and tidy appearance and condition at stations.

Steam cleaning and washing of stations, which must be undertaken periodically, but at least once every two weeks.

High cleaning, which includes the cleaning of all areas, surfaces, and structures within stations that are located higher than 3 (three) meters from the ground, including exposed rooftops. High cleaning will include washing and shall take place at least once per month. Accordingly, the Contractor must ensure that it has the necessary cleaning equipment and adequately trained personnel to perform high cleaning to all required surfaces and equipment, including but not limited to the following:

a) Electronic and other high signage;
b) CCTV camera housings;
c) Passenger information displays;
d) Sign poles;
e) External signage and
f) Internal and external surfaces of the station building including pedestrian bridges.

7.4.5. **Station waste management**. The Contractor must manage the waste bins located on the platforms of the on-corridor stations and ensure the waste bins are cleared to a waste hauler daily. The Contractor is required to organize and procure the removal of this waste with a waste hauler that will be capable of ensuring the recyclables are processed accordingly.

7.4.6. **Corridor cleaning**. The Contractor is responsible corridor cleaning, which is the regular cleaning of the busway corridor (i.e. the dedicated busway infrastructure from Chamkani Depot through the Hayatabad area). The activities described below will form part of corridor cleaning.

Daily removal of visually identifiable trash and waste from the corridor (full length of busway corridor).

Delineator barriers and fencing (i.e. strip separating the busway from the mixed-traffic lanes) must be cleaned and the draining slots must be inspected for obstructions and such obstructions removed. This must be done at least 3 (three) times a week.

The full length of the corridor must be cleaned using the motorized street sweeper, removing all dust and other fine particles from the corridor including the staging facility. This must be done at least once a week. All costs regarding vehicle operations (fuel, driver, mechanics etc.) is for the account of the Contractor.

During periods of rain, ponded water must be removed from the corridor or station area.

The Contractor must ensure that trash and litter generated within the corridor and stations is collected and disposed of in a manner approved by the Employer.

The Contractor must remove all unauthorized banners, streamers, advertising material, stickers, and wall chalking along the corridor, at stations, and on pillars within a reasonable time, which in this instance shall be within 24 (twenty-four) hours after the unauthorized material was first detected.

7.4.7. **Landscaping**. The Contractor must provide landscaping services to the greenery along the busway corridor. The physical scope for the landscaping services includes the greenery in the delineator area between the busway lane and the mixed traffic lanes as well as other greenery within the busway, including plantings at the station areas. Landscaping services shall include necessary watering of the plants and any periodic pruning or care required to keep the landscaping in a healthy and visually-aesthetic condition.

8. Maintenance of Equipment and Software

8.1. Scope and Responsibility

8.1.1. ***Overall scope***. The Contractor is responsible to ensure the availability and performance of all services, equipment and software under the scope of this agreement.

The maintenance regime must be developed to ensure that the systems operate and perform at a high service level and meet the all required KPIs.

The Contractor is responsible for all costs associated with the maintenance regime as well as the replacement of all consumable parts and supplies, including all shipping costs for returned and replaced equipment.

The Contractor may not claim from Employer the costs of any repairs necessary due to damage caused by the negligence or incorrect use of any maintenance equipment or software by Contractor personnel or subcontractors.

8.1.2. Full maintenance and repair responsibility.

The Contractor is responsible for the procurement, installation, and testing of all equipment and software associated with the ITS and any other equipment/software developed under this Contract.

The Contractor is fully responsible for the operation of equipment and software under the scope of this agreement, as well as the maintenance and repair of these items.

The Contractor must take all reasonable measures to mitigate the risk of any latent defect in the equipment and software that falls within the knowledge of the Contractor or should reasonably have fallen within its knowledge.

8.1.3. Minor maintenance and repair responsibility.

The Contractor is responsible for minor maintenance and repairs of equipment and supplies in the BRT stations.

In addition, as the Contractor is responsible for the security of the stations and all equipment within station areas, any loss of or damage to Employer Assets or equipment (including equipment belonging to other Contractors) as a result of vandalism will be the responsibility of the Contractor, who must repair and/or replace such lost or damaged assets at its own cost. Such cost may not be reclaimed form the Employer.

Additional minor maintenance and repair responsibilities include but are not limited to:

a) Maintenance of communication networks, including the fiber backbone;

b) Replacement of loose or damaged floor tiles, paving slabs and segmented paving at stations and along the ramps to street level;

c) Replacement of light bulbs and energy saving devices and equipment;

d) Repair or replacement of damaged sanitary ware and cisterns, paper holders, exhausts, and related equipment in toilets;

e) Repair or replacement of passenger seating/leaning bars at stations;

f) Repair or replacement of damaged joinery;

g) Maintenance of water fountains and replacement of any filters in the water fountains as per the schedule recommended by the equipment supplier;

h) Maintenance/repair of electric ventilator fans at stations;

i) Maintenance and repair of delineator barriers and fencing along the corridor resulting from accidents or other reasons;

j) Maintenance and repair of water pump in underpasses;

k) Repairs to the air conditioners at station fare kiosks and data cabins;

l) Repair/upkeep of fire extinguishers, including regular checking of fire extinguishers and refill of cylinders after use or expiry;

m) Upkeep and supply of medical first-aid kits;

n) Replacement/upkeep of recycling bins and waste bins at stations;

o) Repair/upkeep of station signage and passenger information boards; and

p) Repair of systems used to ensure universal accessibility including tactile surfaces and ramps providing wheelchairs access.

The list above is not exhaustive, and minor maintenance and repairs required will also include tasks that would reasonably be understood to constitute minor maintenance and repairs by a reasonable contractor in the position of the Contractor.

8.1.4. Minor maintenance and repairs: Exclusions.

The following list details the items that are excluded from the Contractor's responsibility in relation to minor maintenance and repairs.

a) Repair and maintenance of stops, emergency generators, elevators, and escalators, automatic station doors (i.e. power screen doors), entry gates (i.e. road blockers) for corridor access control, *unless* repair/replacement is necessary due to the actions of or negligence by the Contractor;

b) Extensive repair, maintenance or replacement of major structures within the stations such as glass panels, roofing material, floor structures and any other major parts, fittings and fixtures of structures within the stations;

c) Repair and maintenance of cycle ways and footpaths outside the station area;

d) Remodeling of station structures;

e) Pavement (rigid or flexible) along the corridor and stations;

f) Street lights and poles along the corridor; and

g) Overhaul of electrical or plumbing systems due to damage or fair wear and tear.

The Employer will separately contract third-party firms for the procurement, maintenance, and repair of these excluded items,. The Contractor is not required to undertake minor maintenance and repairs of any parts covered by third-party guarantees but must facilitate the minor maintenance and repairs performed by such third parties.

8.2. Maintenance Plan and Asset Register

8.2.1. ***Maintenance Plan***. The Contractor must develop a 10 (ten)-year Maintenance Plan for all equipment and software for the ITS (including Fare System) and Station Management and submit this Plan to the Employer. The Maintenance Plan must be submitted within 3 (three) months of contract signing and must include, but is not limited to the following items:

Establishment of major maintenance milestones;

Description of routine and preventative maintenance measures;

Plan for response to incidents; and

Communications on repairs.

8.2.2. ***Asset Register***. The Contractor must maintain an Asset Register for all equipment, supplies, and software for the ITS, Fare System and Station Management Services. The Asset Register must present a complete inventory of these items and must be available for inspection by the Employer at any time for the duration of the Contract.

8.3. Maintenance Schedules

8.3.1. ***Maintenance intervals.*** The Contractor is responsible for removing and replacing defective equipment in accordance with the required repair-times. The Contractor must ensure that all the structures, equipment and components are serviced at the intervals and levels in accordance with manufacturer requirements.

8.3.2. ***Daily checks***. The Contractor must conduct daily equipment and software checks to ensure operability. The Contractor must for this purpose create a maintenance checklist for its personnel. The checklist must include all the assets in the system which are the responsibility of the Contractor. Station Managers must, as a minimum requirement, conduct daily checks, and ensure that:

a) Critical system equipment and software are operational and confirmed to be without any defects;

b) All checks are done in accordance with the equipment listed in the Asset Register; and

c) A daily defect sheet is completed prior to the start of operating hours.

8.3.3. ***Response times.*** All repairs shall be carried out within the prescribed time frames, unless the Employer agrees to an alternative time frame prior to the repair being done. If the Contractor does not perform the repair works within the prescribed or agreed to time frames, the Employer may perform the repairs at the cost and risk of the Contractor, and deduct such costs from the Contractor’s Reserve Fund.

8.4. Maintenance Protocols

8.4.1. The Contractor must develop and implement protocols necessary to prevent equipment and software failure incidents and to respond appropriately in the event of a failure incident. In terms of this requirement, the items and protocols described below must be provided for by the Contractor.

8.4.2. Preventative maintenance protocols

Automated and manual measures. The Contractor must undertake and perform all automated and manual measures to verify correct functioning of equipment and software.

Preventative maintenance. The Contractor must undertake and perform all adaptive, preventative, and corrective maintenance required to ensure correct functioning of equipment and software.

8.4.3. Failure response and incident management

Failure response. The Contractor must make every effort to ensure continuity of operations in case of system failures, including but not limited to the following activities:

a) Execution of back-up procedures and system restore procedures in case of system breakdown/black out of the network/system procedures;

b) Execution of business continuity system, including contingency plans and procedures;

c) Replacing faulty Level 1 Infrastructure equipment with functionally equivalent equipment to restore capacity and throughput;

d) Adopting procedures required to repair any damage occurring in the Level 3 Infrastructure equipment promptly and appropriately;

e) In the case where no deadline applies, the repair and reinstatement of Levels 1-3 must be undertaken as soon as reasonably possible; and

f) Equipment and software that is fundamental to the BRT system's operation must transmit alarms when a fault is detected.

Incident management. The Contractor must develop and implement an online incident management system which will facilitate the logging, prioritizing and reviewing of incidents by authorized Contractor and Employer personnel. This system must be available 24 (twenty-four) hours per day, 7 (seven) days per week.

8.4.4. **Disruptions**. The Contractor must comply with the following obligations during maintenance (planned or otherwise) to minimize traffic disruption as much as possible:

a) Provide and facilitate the safe, efficient, and continuous passage of passengers;

b) Maintain the traffic carrying capacity of the stations and immediate surrounding roads and passageways;

c) Minimize passenger traffic congestion and disruption to public transport;

d) Provide for passenger and pedestrian safety and, where required, alternative routes for walking within or near the construction area; and

e) Minimize impact on service levels and KPIs by performing scheduled and unscheduled maintenance services.

8.4.5. Monitoring and reporting

Recording of repairs*.* To develop statistical models for preventive programming and maintenance and the purchase of spares, all repairs performed must be recorded by the Contractor, indicating the nature of the repair and the time it takes to perform the repair.

Asset Register changes. The Contractor must register all changes to equipment and modules in the Asset Register to preserve the up to date location of each piece of equipment.

Daily monitoring and monthly performance reports**.** The performance of all the relevant aspects of the subsystem must be monitored daily, which will include automated measurements and visual inspection. The Contractor must provide monthly reports on the performance of all operational processes to the Employer, unless indicated otherwise. The Employer must have access to all information on maintenance from the time when the fault is reported up to the time it is resolved. The Contractor must submit monthly reports to the Employer on the condition of the equipment and software. Any latent and patent defects discovered as part of the daily checklist must be reported to the Employer by the Contractor immediately.

Service desk. The Service desk must be available during service operating hours for telephone calls and e-mails from Contractor personnel.

8.4.6. Performance analysis. The Contractor and Employer must perform a monthly joint and detailed analysis of system availability, problem occurrences and problem solving with the intention to continuously improve Contractor services and the relevant BRT system elements.

8.4.7. Management procedures

Change management. The Contractor must support a change management process, providing for impact analyses, system changes, and testing.

Release management. The Contractor must be capable of supporting 1 (one) release of software per quarter, 4 (four) releases per year. Each release shall be fully tested before deployment. When necessary the Contractor must be able to roll back the release within 24 (twenty-four) hours.

Configuration management. The Contractor must ensure up-to-date documentation of all system components and configurations.

8.4.8. **Service support and service delivery**. The Contractor must implement an industry standard IT management framework (e.g. ITIL V2 or V3), or a proprietary or non-proprietary equivalent, to manage service support and service delivery. The Contractor is responsible for the service support and service delivery activities listed below.

Service support activities:

a) ***Incident management***. Restore and resume service as soon as possible after service interruptions and capture all the relevant incident data.

b) ***Problem management***. Analyze incident data and determine the structural improvements that need to be implemented.

c) ***Change management***. Determine, define and approve all required IT system changes, plan for development of, testing and implementing changes in a manner that will result in the minimum service interruptions.

d) ***Release management***. Implement system changes in a logical order and manage and control the implementation process.

e) ***Configuration management***. Register all the system components to support the above-mentioned processes.

Service delivery:

a) ***Capacity management***. Monitor IT capacity utilization and match IT capacity to current and forecasted business needs.

b) ***Availability management***. Monitor IT availability and undertake corrective measures where service levels are not met.

c) ***Continuity management***. Define and maintain actions and processes to restore IT services in case of disasters (e.g. flooding).

d) ***Service level management***. Define and maintain the service catalogs in line with business needs.

e) ***Security management.*** Identify security threats and vulnerabilities and take corrective actions in case of realistic risk exposure.

8.4.9. **Business continuity management**. A business continuity management system for all equipment and software must be implemented by the Contractor. This requirement is described in more detail below.

Contingency plans must be developed for all critical processes and equipment in the BRT system that will dictate to the Contractor how to continue to provide services and to perform vital operations in the event of a disaster, and how to eliminate or reduce the impact of risks and threats.

These contingency procedures must guarantee a minimum service level in operations, and for this purpose, the Contractor will perform the following activities:

a) ***Identification of critical processes.*** The Contractor must identify and prioritize critical services and their macro processes, and determine the resources required to support these services and applications, including maximum times for restoration of each critical service.

b) ***Risk identification and assessment.*** The Contractor must identify all risks that may impact on the provision of critical services. For example, the Contractor must identify the possible risks or threats posed by the possibility of earthquakes, floods, bomb-threats, explosions or terrorist acts, fire, committed telecommunications breakdowns, loss of power, or labor disputes.

c) ***Restorative actions***. The Contractor must identify the restorative actions and prepare guidelines to be taken in order to restore critical services in response to the risks identified.

d) ***Restoration of applications and files***. The Contractor must analyze and evaluate strategies and alternatives for the restoration of vital applications and files. The Contractor must determine the minimum configuration required by a computer to establish and document restoration and execution of each of the vital applications, including the establishment of procedures to protect and recover vital magnetic files. The Contractor must define a general strategy to reduce and/or eliminate the impact of a disaster, and to select alternatives for back-ups for the recovery of critical services.

e) ***Emergency response teams***. The Contractor must create personnel teams to conduct emergency response and recovery processes. The Contractor must identify the primary responsibilities and activities of officers who form part of the emergency management committee, and of the personnel teams that will be directed by the emergency management committee before, during, and after an emergency.

f) ***Emergency response and recovery plan***. The Contractor must determine the required sequence of actions (emergency response, recovery, and normalization) for each disaster scenario (earthquake, floods, etc.). In addition, the Contractor must prepare guidelines and rules to support and improve the contingency plan and for conducting joint tests for recovery of vital applications.

g) ***Contingency manual***. The Contractor must develop and provide a document that includes regulations, guidelines, actions, and information that will facilitate the implementation and update of the contingency plan.

h) ***Training of personnel***. The Contractor must conduct an informative seminar for officers who are responsible for the implementation and improvement of the Contingency Plan.

9. Monitoring and Reporting

9.1. Scope

9.1.1. The Contractor must develop and implement a KPI monitoring system to collect KPI monitoring data. The KPI monitoring data must be shared with the Employer and VOCs in an automated manner. The Contractor must ensure the integrity of the data collected and reported through this system and the availability of the KPI monitoring system to the Employer at all times. The associated KPIs of the Contractor services are listed in *Chapter 10* of this Schedule.

9.1.2. The KPI monitoring system must be able to collect, receive and store all KPI-related information regarding performance of VOCs, ITS, Fare System and Station Management. The Contractor is responsible to calculate the key statistics related to the KPIs, as per *Chapter 10* of this Schedule, and submit these for analysis by the Employer.

9.2. Authorized Personnel and Audit Rights

9.2.1. Contractor may not allow any person access to the KPI Monitoring systems, other than persons authorized by the Employer. The Contractor must provide the Employer with full KPI Monitoring system audit rights.

9.3. Contract Management Functions

9.3.1. All data required to effectively monitor the contractual obligations of the VOCs must be collected by and be available in the KPI monitoring system. This system must therefore be developed by the Contractor to effectively support the Employer's contract management functions.

9.4. Automatically-Generated Reports

9.4.1. The KPI Monitoring System must generate automated reports, set up and based on the initial agreed upon perimeters for regular and standard performance indicators.

9.4.2. These reports must be generated, presented and be available to the Employer for each viewing period (such as daily, weekly, monthly, quarterly, etc.).

9.4.3. The System must provide the necessary functionality to support selective reporting, in that specific performance criteria to be included in automatically generated report, can be selected by the Employer through the System.

9.4.4. Time scaling, output provision, and selections are required support functions for the Employer's contract management system.

9.5. Procurement of KPI Monitoring System

9.5.1. The Contractor must procure, install, test, commission, and operate the KPI Monitoring System and produce reports in line with the requirements stipulated in *Schedule D – Reporting Requirements.*

10. Personnel

10.1. Personnel Requirements

10.1.1. ***Personnel certification***. The Contractor must, no later than ten (10) days after Completion and/or appointment of personnel, provide to the Employer with copies of the following in respect of each personnel member:

a) Appropriate valid identification document; and

b) Proof of successfully passing all training requirements.

10.1.2. ***Personnel list.*** The Contractor must deliver a list of personnel to the Employer (in a format acceptable to Employer) no later than 2 (two) business days after Completion. The list must be updated monthly for the duration of the Contract. The names of incoming and exiting personnel must be provided to the Employer in the format of an exception report.

10.1.3. ***Remedial actions***. Should the Contractor become aware of an Employee who is not fit and proper to execute his/her duties effectively as required, the Contractor must take appropriate action immediately.

10.1.4. Disciplinary action.

Where the Employer has reason to believe that Contractor personnel pose a risk to the safety of passengers, or where a member of the public requests the Employer to investigate the conduct of a particular Contractor personnel member, the Employer must notify the Contractor in writing of the risk or complaint, setting out the reasons for or the nature of the complaint.

The Contractor must take all steps as may be necessary, including where appropriate, conducting an immediate investigation into the allegations and if appropriate, implementing the suspension of such personnel member pending the finalization of appropriate disciplinary action. The Contractor must report the progress of the investigation to the Employer.

Should any disciplinary inquiry be instituted by the Contractor, the outcome thereof, must be reported to the Employer not later than 24 hours upon such inquiry being completed.

10.1.5. Dismissal

If a Contractor personnel member is dismissed as a result of any action or omission directly impacting the Services, or as a result of a disciplinary enquiry, the Contractor must provide the name of that personnel member to the Employer.

The Contractor must keep a biometric System/Attendance system operational and up-to-date and must provide the Employer with online access to biometric/attendance records of personnel deployed at stations for verification purposes.

10.1.6. Training

Training for Contractor personnel. The Contractor must ensure that by (partial) Completion, a sufficient number of personnel required to provide the services, have attended and completed all necessary training sessions conducted by the Contractor. The Contractor must ensure that such personnel obtain the relevant certifications and training and reach the necessary proficiency to operate the ITS, Fare System and Station

Management. The Employer may perform regular spot checks and examinations to ensure that the required skill levels of personnel are maintained in accordance with the Employer's requirements.

Training of the Employer and VOC personnel. The Contractor must ensure that by Completion all Employer personnel members are trained in accordance with these requirements. The Contractor must provide a separate "Train-the-Trainers" program for groups of up to 20 (twenty) VOC personnel members. This training must enable the vehicle operator to train their own drivers and service personnel as required in future. The "Train-the-Trainers" program must involve at least 20 (twenty) hours of instruction.

10.1.7. Uniforms

Uniform requirement. All Employees who perform their duties or parts thereof in view of the public must wear uniforms during the rendering of these services. The Contractor must ensure that its personnel wear identification tags and are appropriately dressed in the prescribed and/or agreed uniforms.

Uniform specification. Uniforms provided by the Contractor must comply with the specification and/or designs provided by the Employer from time to time. The Employer must consult with the Contractor before amending the specification and design of the Uniforms.

Uniform upkeep. The Contractor must take such reasonable steps as may be necessary to ensure that the uniforms are kept in a good condition and is worn in a professional manner, compliant with branding specifications.

10.1.8. Public relations

Employee conduct. The Contractor must ensure that BRT services are provided in a seamless manner and in line with Employer and public expectations. The Contractor must ensure that all Contractor personnel:

a) Communicate with passengers and members of the public in a polite, professional and helpful manner;

b) Conduct themselves at all times as if they were Employer personnel and, in a manner, befitting the Employer's image and brand;

c) Refrain from conduct that may bring the Employer and the BRT System into disrepute; and

d) Deal with customer complaints in a responsive and courteous manner.

Training. The Contractor must ensure that all the personnel receive appropriate training in the following areas:

a) Service requirements of customers and/or passengers with disabilities;

b) Management of confrontational or difficult customers and/or passengers;

c) Occupational health and safety issues;

d) Customer care and customer relations;

e) Compilation of claims; and

f) Passenger safety, which must include amongst other aspects, procedures pertaining to safe embarking and disembarking of passengers and ensuring that vehicle doors are closed only when it is safe to do so.

10.1.9. ***Language.*** All personnel members that work in direct interface with passengers, must be literate and able to communicate effectively with passengers.

10.2. Minimum Personnel Requirements

10.2.1. In certain instances a minimum requirement relating to available personnel and personnel activities are prescribed. These instances are listed and described below. It is the responsibility of the Contractor to ensure that all minimum requirements are met, taking into account factors such as shifts, off-time, scope of work, and local labor laws.

10.2.2. International personnel.

International experts must be utilized for the design, development, testing, and commissioning of the equipment and software and for providing advisory and supervisory support during the first year of operations.

The international experts are each required to provide a minimum of 12 (twelve) person-months input during the equipment installation period and during the first year of operation. They are required to be physically present during the installation period and intermittently present during the first year of operations.

The international experts must therefore be physically present for a minimum of 4 (four) person-months in total.

All international experts must be fluent in English and possess excellent inter-personal and communication skills.

The following table summarizes the minimum personnel requirements for international experts.

Position	Activities	Minimum duration
International Team Leader, Project Manager (International)	Principal representative of the Contractor to the Employer. Coordinates and supervises all project activities during the design process and through the period of testing, installation, and commissioning. Supervises quality control during the first year of operations.	12 (twelve) person-months (intermittent during the equipment installation period and first year of operation)
ITS Manager (International)	Responsible for the design, development, installation, testing and commissioning of the ITS equipment and all its components, including Control Centre equipment and software, vehicle ITS integration, station ITS equipment and software, surveillance system equipment and software, and fibre optic network. Supervises quality control of the ITS during the first year of operations.	12 (twelve) person-months (intermittent during the equipment installation period and first year of operation)
Fare System Manager (International)	Responsible for the design, development, installation, testing, and commissioning of the Fare System. Supervises quality control of the Fare System during the first year of operations.	12 (twelve) person-months (intermittent during the equipment installation period and first year of operation)

Table 1: Summary of Minimum Personnel Requirement for International Experts

10.2.3. ***National personnel***. National personnel are responsible for the day-to-day operations of the System Control activities for the duration of the Services Contract.

ITS personnel

a) The ITS Service personnel are responsible for the control, management, and informational activities performed at the OCC . The Contractor must secure the minimum OCC personnel members detailed in table format below.

b) Type and number of personnel:

Type	Requirement
National Team Leader, Control Center Manager	One (1) personnel member during operating hours of the Control Center
Fleet Management Specialists	At least two (2) personnel members staffing the fleet management work stations during the operating hours of the Control Center
Security Surveillance Specialists	At least two (2) personnel members staffing the work stations for the security surveillance system

Table 2: Summary of Type and Number of ITS Personnel

Fare System personnel

a) The Fare System personnel are responsible for card registration, fare sales, customer services, revenue management, and fare system reporting.

b) Type and number of personnel:

Type	Requirement
Fare System Manager	One (1) personnel member per station
Fare Sales Specialists	At least one (1) personnel member per station during operating hours
Conductors	One (1) female and one (1) male personnel member during operating hours per bus operating off-corridor. Sixteen (16) male personnel members during peak hours at busy stops. Eight (8) teams of armed[1] personnel members (purchase and license of non-lethal weapon responsibility of Contractor) on on-corridor and off-corridor BRT vehicles If such services are required to increase, decrease, or be eliminated in this category/Type, the payments to Contractor will be adjusted with 130% of the legal minimum wage salary per personnel member per shift employed by the Contractor.

Table 3: Type and Nature of fare System Personnel

10.2.4. Station Management personnel

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[1] The roving security personnel for the BRT vehicles shall only be “armed” with non-lethal weapons in the form of a taser device.

Station Management personnel are responsible to provide the services relating to fare media sales and registration, sales of shared value top-ups, security, station cleaning, waste management, busway cleaning, landscaping, and customer services.

Type and number of personnel:

Type	Requirement
Station Services Manager	One (1) personnel member during operating hours of the stations
Station Managers	One (1) personnel member per station during operating hours
Security Manager	One (1) personnel member during operating hours of the system
Security guards	One (1) male and one (1) female per access control barrier per station during operating hours, or more as required to meet KPIs One (1) security guard per station at the platform level during operating hours One (1) personnel member per station to watch over entire station during non-operating hours One (1) personnel member per pedestrian tunnel and/or one (1) personnel member per pedestrian bridge during operating hours. Additional as per requirements to meet requirements of scope and KPI
Passenger flow monitoring and customer service representatives	One (1) personnel member per station during operating hours
Cleaning personnel	Three (3) personnel member per station, or more as required to meet the KPIs and requirements of Scope of Work
Toilet attendant	One (1) personnel member during business/operations hours per toilet set. Additional as per requirement to meet requirement of scope and KPI
Security guard at corridor entrance	One (1) armed security guard (procurement and licensing of weapon is the responsibility of the Contractor) at each entry point of corridor; there are nine (9) entry point locations in the system
Landscapers	Four (4) personnel members for the landscaping along the busway corridor. Additional as per requirements to meet requirements of scope and KPI

Table 4: Summary of Station Management Personnel

11. Warranty and Cyber Security

11.1. General Warranty Requirements

11.1.1. ***Statement of warranty.*** The Contractor must provide a statement of warranty together with the Contractor Proposal that describes the system warranty coverage, in accordance with the warranty requirements stipulated hereinafter.

11.1.2. ***Usage rights***. The Contractor must also together with the Proposal submit a warranty that it has valid and current title to the system and has the right to sell it to the Employer free of any proprietary rights of any manufacturer (if the Contractor is not the manufacturer) or other party, and free of any lien or encumbrance. The Contractor must also warrant that it has good title and/or alternatively licensing rights to all system software, free of any proprietary rights of any other party and free of any other lien or encumbrance.

11.2. Software Warranty

11.2.1. ***Software quality***. The Contractor must provide the following warranties relating to software quality:

that all software is free of defects in design and workmanship and will perform according to the specifications; and

that all software does not contain any timers, counters, or pre-programmed devices that will cause the software to be erased, inoperable, or incapable of performing as specified.

11.2.2. ***Software security.*** With regard to software security the Contractor must warrant that:

all software contains an appropriate security and control system for protecting the software and the data from unauthorized use; and

all software is free of “back doors” and all other known methods of software access that bypass the normal system security features.

11.2.3. ***Software updates.*** The Contractor is required to develop, test, provide, and install all applicable software “patches” or upgrades that become necessary to remedy system software faults or “bugs” identified. The Contractor must provide, at no additional cost, all version updates, software patches, and error corrections available for the system software provided.

11.3. Cyber Security

11.3.1. Standard of care

The Contractor acknowledges and agrees that, during the period of engagement with the Employer, the Contractor may receive or have access to commercial- and/or operational information. The Contractor must comply with the terms and conditions set forth in this Contract in its collection, receipt, transmission, storage, disposal, use, and disclosure of such commercial- and/or operational information. The Contractor will be held responsible for any unauthorized collection, receipt, transmission, access, storage, disposal, use, and disclosure of any commercial- and/or operational information under its control or in its possession, by authorized and unauthorized personnel. The Contractor is responsible for, and will be liable to the Employer for the above unauthorized actions of its personnel, as if these unauthorized actions were the unauthorized actions of the Contractor.

In recognition of the foregoing, the Contractor agrees to act in accordance with the following:

a) The Contractor will hold and maintain all commercial- and operational information in strict confidence, using such degree of care as is appropriate and necessary to avoid unauthorized access, use or disclosure.

b) The Contractor will use and disclose commercial- and/or operational Information solely and exclusively for the purposes for which the said information is provided pursuant to the terms and conditions of this Contract. The Contractor will not, without the Employer's prior written consent use, sell, rent, transfer, distribute, or otherwise disclose or make available commercial- and/or operational information for the Contractor's own purposes or for the benefit of anyone other than Employer.

c) The Contractor will not, without the express written consent of the Employer to the extent expressly required by the applicable law(s), disclose commercial- and/or operational information directly or indirectly, to any person other than an authorized personnel member. In the event that written consent must be obtained, the Contractor will:

d) Notify the Employer prior to such disclosure or as soon thereafter or as reasonably possible; and

e) Be responsible for and remain liable to the Employer for the actions and omissions concerning the treatment of such commercial- and/or operational information, as if they were the Contractor's own actions and omissions.

11.3.2. Information security

Contractor represents and warrants that its collection, access, use, storage, disposal, and disclosure of commercial- and/or operational information complies with all applicable privacy and data protection laws, as well as all other applicable regulations and directives.

Without limiting the Contractor's obligations under this Schedule, the Contractor must, in order to protect commercial- and/or operational information, implement administrative, physical, and technical safeguards that are no less rigorous than accepted industry practices, including the standards prescribed by the International Organization for Standardization (ISO/IEC 27001:2013 – Information Security Management Systems – Requirements and ISO-IEC 27002:2013 – Code of Practice for International Security Management), and any other applicable industry standards applicable to information security. The Contractor must ensure that all such safeguards, including the manner in which commercial information and/or operational information are collected, accessed, used, stored, processed, disposed of and disclosed, comply with applicable data protection and privacy laws as well as the terms and conditions of this Contract.

The safeguards for the protection of commercial and/or operational information implemented by the Contractor must, at a minimum, include the following measures:

a) Limit access of commercial- and/or operational information to authorized personnel only;

b) Secure business facilities, data centers, paper files, servers, back-up systems and computing equipment, including but not limited to all mobile devices and other equipment with information storage capability;

c) Implementation of network, device application, database and platform security;

d) Secure information transmission, storage and disposal;

e) Implementation of authentication and access controls within media, applications, operating systems and equipment;

f) Encryption of commercial and/or operational information stored on any mobile media;

g) Encryption of commercial and/or operational information transmitted over public or wireless networks;

h) Maintaining strict segregation between commercial- and operational information on the one hand, and Contractor information or information belonging to other contractors, to ensure that commercial and/or operational information is not commingled with any other information or type of information;

i) Implementation of appropriate personnel security and integrity procedures and practices, including but not limited to conducting background checks; and

j) Provision of appropriate privacy and information security training to the Contractor personnel.

During the employment term of each authorized Contractor personnel member, the Contractor must ensure that the authorized personnel member performs strictly in line with the Contractor's obligations under this Contract. The Contractor further agrees that it will implement and maintain a disciplinary process to address any unauthorized access, use or disclosure of commercial- and/or operational information by any of its officers, partners, principals, personnel, agents or contractors. Upon receipt of a written request from the Employer, the Contractor must promptly identify for Employer in writing all authorized personnel as of the date of such request.

Upon receipt of a written request from the Employer, the Contractor must provide the Employer with a network diagram that outlines the Contractor's IT network infrastructure and all related equipment used to fulfill its obligations under this Contract, including without limitation:

a) Connectivity to the Employer and all third parties who may access the Contractor's network to the extent the network contains commercial- and/or operational information;

b) All network connections including remote access services and wireless connectivity;

c) All access control devices (e.g. firewall, packet filters, intrusion detection and access-list routers);

d) All back-up or redundant servers; and

e) Permitted access through each network connection.

11.3.3. Security breach procedures

The Contractor must:

a) Provide the Employer with the name and contact information for an personnel member of the Contractor who must serve as the Employer's primary security contact. This personnel member must be or make personnel available to assist the Employer 24 (twenty-four) hours per day, 7 (seven) days per week, to resolve obligations associated with a Security Breach; and

b) Notify the Employer of a Security Breach as soon as practicable, but no later than 24 (twenty-four) hours after Contractor becomes aware of such breach.

11.3.4. The Parties must, immediately subsequent to receipt by the Employer of Contractor's notification of a Security Breach, coordinate their actions to investigate the Security Breach. The Contractor agrees to cooperate with the Employer within reason in the Employer's handling of the matter, including, without limitation:

a) Assisting with any investigation;

b) Providing the Employer physical access to the facilities and operations affected;

c) Facilitating interviews with Contractor personnel and others involved in the matter; and

d) Making available all relevant records, logs, files, data reporting and other materials required to comply with applicable laws and regulation.

11.3.5. The Contractor must, at the Contractor's expense and in accordance with applicable laws, regulations and standards, use its best efforts to immediately remedy any Security Breach and prevent any further Security Breach.

11.3.6. Other than to inform a complainant (customer/passenger lodging a complaint) that the matter has been forwarded to the Employer's legal counsel, the Contractor agrees that it will not inform any third party of any Security Breach without first obtaining the Employer's written consent. Furthermore, the Contractor agrees that the Employer will have the sole right to determine whether:

a) Notice of the Security Breach is to be provided to any individuals, regulators, law enforcement agencies, consumer reporting agencies or others as required by law or regulation; and

b) Any remediation will be offered to affected persons, and the nature and extent of any such remediation.

11.3.7. The Contractor agrees to fully cooperate, at its own expense, with the Employer in any litigation or other formal action deemed reasonably necessary by the Employer to protect its rights relating to the use, disclosure, protection and maintenance of commercial- and/or operational information.

11.3.8. In the event of any Security Breach, the Contractor must use its best efforts to prevent a recurrence of any such Security Breach.

11.3.9. ***Oversight***. To confirm compliance with this Contract as well as with any other applicable laws and industry standards, the Contractor must, upon receipt of a written request from the Employer requesting such, promptly and accurately complete a written information security questionnaire provided by the Employer or a third party on behalf of the Employer, regarding the Contractor's business practices and IT environment in relation to all commercial- and/or operational information being handled and/or services being provided by the Contractor to the Employer pursuant to this Contract. The Contractor must fully cooperate with this process.

11.3.10. ***Return or destruction of information***. At any time during the term of this Contract at the Employer's request or, upon termination or expiration of this Contract for any reason, the Contractor must instruct all authorized personnel, to promptly return to the Employer all copies, whether written, electronic or other form or media, of commercial- and/or operational information in its possession or in the possession of such authorized personnel, or securely dispose of all such copies, and certify in writing to the Employer that such commercial- and/or operational information has been returned to the Employer or disposed of securely.

11.4. Indemnification

11.4.1. The Contractor must defend, indemnify and hold harmless the Employer and Employer's respective officers, directors, personnel, agents, successors and permitted assigns, from and against all losses, damages, liabilities, deficiencies, actions, judgments, interest, awards, penalties, fines, costs or expenses of whatever kind, including reasonable attorneys' fees, the cost of enforcing any right to indemnification hereunder and the cost of pursuing any insurance providers, arising or resulting from any third-party claim against the Employer, arising or resulting from the Contractor's failure to comply with any of its obligations under this section.

12. Key Performance Indicators

12.1. Definition of Key Performance Indicators

12.1.1. The Contractor's performance on operations and services as defined in this document will be evaluated in terms of specific service levels for Key Performance Indicators (KPIs).

12.1.2. Failure to meet these service levels will result in the application of Performance Deduction Percentages as per the table shown below. The Employer must notify the Contractor of the Performance Deduction Percentage within 10 (ten) days of submission of invoice by the Contractor.

12.1.3. Employer may at all reasonable times, directly or through an Employer-appointed independent agent, observe, inspect, and satisfy itself with the observance by Contractor of the KPIs.

12.1.4. The systems must be designed and operated to meet the KPIs detailed in the table below.

	KPI	Failure Event	Performance Deduction Percentage
1	**STATION SAFETY**	***Assessment through self-reporting and monitoring by the Employer***	
1.1	Prevention of Severe Accidents	Accident involving ITS equipment and software, Fare System equipment and software and station operations equipment and software due to the Contractor's fault or malfunctioning of equipment in death or severe physical injury of a passenger or other person (**Severe Accident**)	10% per occurrence
1.2	Prevention of Material Accidents	Accident involving ITS equipment and software or station operations equipment and software due to the Contractor's fault or malfunctioning of equipment resulting in minor physical injury of a passenger or other person or material damage to the Employer assets (**Material Accident**)	5% per occurrence
1.3	Immediate reporting of emergencies	Emergency not reported to Employer and the police within 15 (fifteen) minutes of its occurrence	0.2 % per occurrence
1.4	Quick resolution of Security Equipment failures	Security Equipment Defect (SED) (as defined in paragraph 10.3.5) not resolved within the relevant Defect Resolution Period (as defined in paragraph10.3.5) SED = (No of SED not responded Timely/Total number of SED reported by Contractor) x 100	1% per 5 % of SED not resolved timely

	KPI	Failure Event	Performance Deduction Percentage
1.5	Prevention of strikes	Number of operating minutes in which the Contractor or its personnel did strike and shutdown system partially or fully	5 % per incident which continue for more than 20 minutes plus loss of passenger revenue (if any)
1.6	Misbehavior	Personnel does not adhere to code of conduct or misbehaves severely with Contractor personnel or passengers	0.3% per occurrence
2	**Fare System Services**	***Assessment through automatic monthly reporting***	
2.1	Quick resolution of Fare System failures	Fare System Defect (FSD) (as defined in paragraph 10.3.3) not resolved within the relevant Defect Resolution Period (as defined in paragraph10.3.3) FSD = (No of FSD not responded Timely/Total number of FSD reported by Contractor) x 100	1% per 3 % of FSD not resolved timely plus actual passenger revenue loss (if any calculated from statistical figures)
2.2	Safeguarding of operational data	Some operational data irrecoverably lost	1% per occurrence
2.3	Personnel	Non-compliance with any aspect of the requirements of section 8 of this Schedule	0.5 % per occurrence
2.4	Top-up outside the stations	Failure to support top-up of smart cards using mobile money from all mobile money providers (with a national market share over 5%)	1% per calendar month from the sixth month after Completion
2.5	Fare System services	Non-compliance with any aspect of the requirements of paragraph 3 (Excluding Fare System failure)	0.6% per occurrence
2.6	Passenger service	Queuing time at point-of-sales exceeding 30 seconds per point-of-sale (Average time between issuance or recharge of fare measured over a fifteen-minute period in face of queue).	0.05% per occurrence

	KPI	Failure Event	Performance Deduction Percentage
2.7	Enforcement of validation	Number of occurrences wherein a passenger is detected by Employer in the paid area of a station or on a BRT vehicle without a validated fare media	0.1% per occurrence
2.8	Call Center availability	Help line website is down	0.5% per day
2.9	Fare System integrity	There is an irreconcilable difference between any one of the data on the fare media, the message displayed on point-of-sale, gate, or handheld device and the transaction data as registered by Level 3 and settled	0.5% per incident
2.10	Daily revenues	Failure to remit to the Employer the full stored value sales and single-use fare sales as registered by the Fare System Level 3	0.2% per incident of delay per day
2.11	Cyber security	Failure to adhere to the cyber security requirements of section 9 of this document	1 % per incident
3	**ITS SERVICES**	***Assessment through automatic monthly reporting by ITS and monitoring by the Employer***	
3.1	Quick resolution of ITS failures	ITS Defect (ITSD) (as defined in paragraph 10.3.2) not resolved within the relevant Defect Resolution Period (as defined in paragraph10.3.2) ITSD = (No of ITSD not responded Timely/Total number of ITSD reported by Contractor) x 100	1% per 3 % of ITSD not resolved timely
3.2	Safeguarding of operational data	Some operational data irrecoverably lost	1% per occurrence
3.3	Scheduling	Non-compliance with any aspect of the requirements of paragraph 2.2 excluding ITS defects	0.6 % per occurrence
3.4	Fleet management	Non-compliance with any aspect of the requirements of paragraph 2.3 excluding ITS defects	0.6 % per occurrence
3.5	Real-time passenger information	Non-compliance with any aspect of the requirements of paragraph 2.4 & 2.5 excluding ITS defects	0.3 % per occurrence

	KPI	Failure Event	Performance Deduction Percentage
3.6	KPI monitoring	Non-compliance with any aspect of the requirements of Chapter 10 of this Schedule	0.7% per occurrence
3.7	Asset register	The Asset Register is not maintained, not up-to-date or incomplete or RFID tags missing	0.6 % per day in failure
3.8	UFH/VHF availability in Control station and BRT vehicles	Number of hours in a month in which the central UHF/VHF communication systems is not functioning	0.5 % per day per device subject to maximum of 2%
3.9	IP Phones availability	Number of days in which IP Phones are not functioning	0.5 % per day per phone set subject to maximum of 1 %
3.10	Change management	Configuration changes are not implemented within one month from the Employer notification	0.5 % per day in failure
3.11	Repetition of issues/problems	Occurrence of same issues by more than 10 times in the same month	0.5 % per 10 issues
4	**Station Management Services**	***Assessment through monitoring by the Employer***	
4.1	Quick resolution of station defects	Station Defect (SD) (as defined in paragraph 10.3.4) not resolved within the relevant Defect Resolution Period (as defined in sub paragraph 10.3.4) SD = (No of SD not responded Timely/Total number of SD reported by Contractor) x 100	1% per 3 % of SD not resolved timely
4.2	Station operating hours	Stations not being open for the full duration of the daily operations	0.7% per station
4.3	Station Management	Disruption of, or negative impacts on, the BRT Vehicle Services due to any conduct of the Contractor	0.5% per hour or part thereof for as long as the disruption occurs.

	KPI	Failure Event	Performance Deduction Percentage
4.4	Toilet supervision	Failure to ensure continuous supervision of the toilets on the stations, inclusive of cleaning the toilet and replenishing supplies (dirty Toilets).	0.5% per station per day of occurrence
4.5	Staff behavior	Any conduct the brings the Employer or the BRT Services into disrepute	0.5% per occurrence
4.6	Maintenance and general	Non-compliance with any aspect of the requirements of section 6 of this Schedule excluding Station Defects	0.7% per occurrence
4.7	Security and surveillance, Cleaning and Landscaping	Non-compliance with any aspect of the requirements of section 4 of this Schedule excluding Station Defects	0.5% per occurrence
4.8	Construction safety	Execute works without precautionary measures for passengers/general public safety	1% per day
4.9	Emergency response	Any incident in which an emergency vehicle has not reached the emergency area within 30 minutes from being notified	1% per occurrence
4.10	Off-board inspection	Failure to provide two shifts of 16 personnel members each for security and sales services at busy stops during service operating hours	0.5% per personnel members per shift
4.11	On-board security and inspection	Failure to provide eight (8) teams of two (2) personnel members each for on-board security on on-corridor vehicles. Failure to ensure one male and one female on board of all vehicles operating off-corridor to inspect all passengers, perform check-in and –out validation and sales of single use tickets	0.5% per team per occurrence 1% per vehicle delayed or not operating due to lack of conductors
4.12	Employment Opportunity Program	Non-compliance with any aspect of the requirements of section 11 of this Schedule	0.5% per occurrence
4.13	Gender Action Plan	Non-compliance with any aspect of the requirements of section 12 of this Schedule	0.5% per occurrence
5	**Reporting**	***Assessment through monitoring by the Employer***	

	KPI	Failure Event	Performance Deduction Percentage
5.1	Daily settlement report	Daily settlement report, including all required constituent parts as per *Section VI - Schedule D – Reporting Requirements*, not provided for each` business day specified submission date	1% per day
5.2	Monthly operations report	Monthly operations report, including all required constituent parts as per *Section VI - Schedule D – Reporting Requirements*, not provided for each business day specified submission date	1% per day of delay
5.3	Transparent self-reporting	Misrepresentative monthly operations report	2 % per occurrence
5.4	Integrity	Falsification of facts and information or breach of confidentiality of information/documents	2 % per occurrence
5.5	Dragnet clause	Any act/instance that is non-conforming or a violation of Contract / scope of services / Schedule of Requirements/Rules or Regulations of Contractor / Instructions given by the Employer, unless covered by another KPI	1 % per occurrence
5.6	Frequently occurred violations	Occurrence per violation listed in table below, unless covered by another KPI Note: This Liquidated Damages will be only applicable, if any other Liquidated Damages is not applicable under the Agreement/Contract	0.2% per occurrence

Table 5: Summary of KPI Design Requirements

12.2. Frequently Occurred Violations

12.2.1. Frequently occurred violations that are covered by the KPIs are detailed in the table below.

	Failure Event
1	Late arrival of personnel at stations (calculated per person)
2	UPS or generator not functional (irrespective of power failure) (calculated per device)
3	Videos are not of required resolution (calculated per day)

	Failure Event
4	Live video of specific camera is not available (calculated per camera)
5	Late opening or early closing of fare sales offices (calculated per fare sales office per 30 minutes)
6	Non-availability of fare media in fare vending offices and at Ticket Vending Machines (calculated per fare sales office / Ticket Vending Machine)
7	Staff not available in the Control Center
8	Lazy work by personnel/smoking at stations by the personnel
9	Staff seen spitting
10	Staff shouting at passengers
11	Manipulation of data
12	Non-availability of website for monitoring of bus operations (for more than 30 minutes)
13	Non-availability or poor quality of video (calculated per day)
14	Scratches on video wall (calculated per day)
15	Ticket Vending Machine not accepting currency (calculated per instance)
16	Personnel not giving receipts of sale to passenger or for card repair (calculated/instance)
17	Not attending/responding complaints received on complaint management system or share through other mechanism (calculated per day)
18	Complaint logging system for interface with the Contractor is down (calculated per 30 minutes)
19	Excess deduction of fare (calculated per transaction)
20	Reports in required format are not provided (calculated per month per report)
21	Contractor personnel violate the approved code of conduct
22	Loss of Employer assets (calculated per device per day)
23	Late or non-submission of traveled kilometers at start of the month (calculated per day) or date specified by Employer

	Failure Event
24	Absence of personnel at designated points for more than hour (calculated per hour)
25	Failure to inform malfunctioning equipment
26	Failure to facilitate physically disabled person (calculated per instance)
27	Lack of policies that promote environment for female personnel members (calculated per instance)
28	Contractor office in location that is not accessible to specially challenged persons (calculated per month)
29	Delay of repair of Employer property caused by Contractor (calculated per day)
30	Use of equipment/power in non-operating hours
31	Installation of non-standard equipment
32	Misuse of Employer infrastructure
33	Non-recharge of card at mobile networks
34	Allowing passengers inside the off-corridor BRT vehicle without security check
35	Failure to meet required function of Schedule of Requirements (all sections)
36	Non-availability of fare media at fare sales office (calculated per 10 minutes)
37	Ridership figures not identical with passenger numbers recorded in video (calculated per hour)
38	System time not matching with Pakistan Standard time (calculated per day)
39	Non-availability of online attendance of personnel assigned to stations (calculated per day)
40	Non-availability of insurance or late renewal of insurances (calculated per day)
41	Non-availability of website envisioned under the contract
42	Non-availability of mobile applications (calculated per day)
43	No announcement or wrong announcement or lack of display on RTPI

	Failure Event
44	Failure of any equipment or subsystem (calculated per day per equipment)

Table 6: Summary of Frequently Occurring Violations

12.3. Definitions

12.3.1. Performance Deduction Percentage

The Performance Deduction Percentage applicable will be as follows:

a) During the first (1st) complete calendar month from the Readiness Date, 0% (zero percent); and

b) From the second (2nd) calendar month from the Readiness Date, the sum total of Performance Deduction Percentages applicable for all Failure Events having occurred during that month, subject to a maximum of 100% (one hundred percent).

The list of KPIs, the list of Failure Events and the Performance Deduction Percentages applicable for each Failure Event may be amended by Employer from time to time.

Where the Employer has determined that the reasons for the occurrence of a Failure Event fell outside of the Contractor’s control and responsibilities, the Failure Event may not result in a Performance Deduction Percentage.

12.3.2. ITS Defects

Severe ITS Defect. A Severe ITS Defect means a failure of ITS equipment and software or ITS services (excluding fare collection) resulting in a financial loss, service loss, and operational data loss or a severe degradation of BRT vehicle operations.

Material ITS Defect. A Material ITS Defect means a failure of the ITS equipment and software or ITS services (excluding fare collection) resulting in a potential financial loss, service loss, a potential operational data loss or a material degradation of BRT vehicle operations.

Minor ITS Defect. A Minor ITS Defect means a failure of the ITS equipment and software or ITS services (excluding fare collection) not resulting in any potential financial loss, service loss, any potential operational data loss or any material degradation of BRT vehicle operations.

ITS Defect. An ITS Defect means a Severe ITS Defect, a Material ITS Defect, or a Minor ITS Defect. The nature of the defect will be decided by the Contractor. For purposes of clarity, any instruction issued under the scope of services for defect rectification or maintenance of equipment/software/stations or correct functioning or instruction for maintaining useful life of equipment or non-availability of service or maintaining image of system, shall also fall under Defects.

ITS Defect Resolution Period. The ITS Defect Resolution Period means:

a) For a Severe ITS Defect, 2 (two) hours;

b) For a Material ITS Defect, 4 (four) hours; and

c) For a Minor ITS Defect, 7 (seven) days.

12.3.3. Fare System Defects

Severe Fare System Defect. A Severe Fare System Defect means a failure of the Fare System equipment and/or software resulting in a financial loss, service loss, an operational data loss or inconsistencies in the operational data, or a severe degradation of the passenger experience using the Fare System.

Material Fare System Defect. A Material Fare System Defect means a failure of the Fare System equipment and/or software resulting in a potential financial loss, service loss, a potential operational data loss or a material degradation of the passenger experience using the Fare System.

Minor Fare System Defect. A Minor Fare System Defect means a failure of the Fare System equipment and software not resulting in any potential financial loss, service loss, any potential operational data loss or any material degradation of the passenger experience using the Fare System.

Fare System Defect. A Fare System Defect means a Severe Fare System Defect, a Material Fare System Defect, or a Minor Fare System Defect. The nature of the defect will be decided by the Contractor. For purposes of clarity, any instructions issued under the scope of services for defect rectification or maintenance of equipment/software/stations or correct functioning or instruction for maintaining useful life of equipment or non-availability of service or maintaining image of system, shall also be regarded as part of Defects.

v. Fare System Failure Resolution Period. The Fare System Failure Resolution Period means:

a) For a Severe Fare System Defect, maximum of 2 (two) hours;

b) For a Material Fare System Defect, maximum of 4 (four) hours; and

c) For a Minor Fare System Defect, maximum of 7 (seven) days.

12.3.4. Station Defects

Severe Station Defect. A Severe Station Defect means a defect to a station affecting or potentially severely affecting the safety of passengers, the collection of fares, or the safety of BRT vehicle operations, including, but not limited to, any of the following:

a) Objects protruding from station onto road;

b) Water on platforms or slippery surfaces at stations;

c) Roof problems or defects;

d) Absence of fire extinguisher equipment or medical first-aid kit;

e) Part of station infrastructure unsecured to structure;

f) Obstruction causing disturbance of BRT vehicle operations, obstructing circulation of passengers and items causing safety to passengers;

g) Graffiti on stations, pillars, or corridor;

h) Ponding water on corridor during rains;

i) Objects on ground and elsewhere creating station hazard;

j) Exposed electricity cables;

k) All gate defects; and

l) Station closed during operation hours.

ii. Material Station Defect. A Material Station Defect means a defect to a station affecting the usage of the BRT system, including, but not limited to the following:

a) All passenger information displays at a station being defective or not in full and complete working order;

b) Failure to deploy sufficient security personnel to check each passenger prior to passage to the paid area and in accordance with the security and safety policy;

c) Failure to remove illegal banners, streamers, advertising material etc. at stations, pillars and along corridor; and

d) Failure to deploy sufficient cleaning personnel at stations to conduct cleaning services as required.

Minor Station Defect. A Minor Station Defect means a defect to a station or Terminal affecting the comfort of passengers or Contractor personnel, including, but not limited to the following:

a) Incomplete or expired medical kit;

b) Any required information signage not being displayed properly in station; and

c) Universal power supply and communications back-up facilities at a station are defective or not in full and complete working order.

Station Defect Resolution Period. The Station Defect Resolution Period means:

a) For a Severe Station Defect, 2 (two) hours;

b) For a Material Station Defect, 4 (four) hours; and

c) For a Minor Station Defect, 7 (seven) days.

Station Defect. A Station Defect means a Severe Station Defect or a Material Station Defect or a Minor Station Defect. The nature of the defect will be decided by the Contractor. For purposes of clarity, any instructions issued under the scope of services for defect rectification or maintenance of equipment/software/stations or correct functioning or instruction for maintaining useful life of equipment or non-availability of service or maintaining image of system, shall also fall under Defects.

12.3.5. Security Equipment Defect

Severe Security Equipment Defect. A Severe Security Equipment Defect means a failure of the Security Equipment and/or its software resulting in a service loss.

Material Security Equipment Defect. A Material Security Equipment Defect means a failure of the Security Equipment and/or Software resulting in a potential service loss.

Minor Security Equipment Defect. Minor Security Equipment Defect means a failure of the Security Equipment and/or Software not resulting in any service loss.

Security Equipment Defect. A Security Equipment Defect means a Severe Security Equipment Defect, a Material Security Equipment Defect, or a Minor Security Equipment Defect. The nature of the defect will be decided by the Contractor. For purposes of clarity, any instructions issued under the scope of services for defect rectification or maintenance of equipment/software/stations or correct functioning or instruction for maintaining useful life of equipment or non-availability of service or maintaining image of system, shall also fall under Defects.

Security Equipment Defect Resolution Period. The Security Equipment Defect Resolution Period means:

a) For a Severe Security Equipment Defect, maximum of 2 (two) hours;

b) For a Material Security Equipment Defect, maximum of 4 (four) hours; and

c) For a Minor Security Equipment Defect, maximum of 7 (seven) days.

13. Employment Opportunity Program

13.1. Employment Opportunity Program (EOP) List

13.1.1. The Employer intends to launch an EOP for personnel members that will become surplus personnel due to the scrapping of the existing bus, minibus, and wagon fleet. The Employer will prepare the list of existing personnel (EOP List), and that list will be shared with the Contractor under the Employment Opportunity Program led by the Employer.

13.2. EOP Target

13.2.1. The Contractor must, for a period of no less than 2 (two) years from the Commencement date, ensure that at least thirty percent (30%) of its Employees shall be sourced and employed from the EOP List. The Contractor shall screen the potential personnel on the EOP List and provide the necessary training required to achieve and maintain the thirty percent (30%) threshold.

13.3. Failure to meet EOP Target

13.3.1. Should the percentage of Employees employed from the EOP List at any time fall below the required threshold referred to above, the Employer will be entitled to request that the Contractor provides the Employer with a statement setting out the following:

Reasons for failing to maintain the required threshold;

All steps taken by the Contractor to meet and maintain the threshold (including providing applicable training to available but unqualified potential personnel); and

Any other factors that the Contractor considers relevant in assisting the Employer to exercise its discretion under the provisions of paragraph 11.4 below.

13.4. Waiver of Potential Penalties

13.4.1. After consideration of the Contractor’s statement and such further information as the Employer may request, the Employer shall be entitled, in its sole discretion, to waive all or part of any applicable Penalty under the KPIs.

14. Gender Action Plan

14.1. Female Employment Target

14.1.1. The Contractor must for the duration of the Contract Term, ensure that at least 20% (twenty percent) of its Employees are female. The Contractor must also develop internal policies to promote a working environment for women, and persons with disabilities, in line with national regulations.

14.2. Universal Accessibility

14.2.1. Offices hired/used by the Contractor must be universally accessible to all personnel, including women, children, and persons with disabilities. The Contractor must provide employment opportunities to persons with disabilities in accordance with the relevant laws applicable and provide equal employment opportunities irrespective of gender preference.

14.3. Failure to meet Target

14.3.1. If the percentage of female Employees employed at any time fall below the required threshold referred to above, then the Employer will be entitled to request that the Contractor provides the Employer with a statement setting out the following:

Reasons for failing to maintain the required thresholds;

All steps taken by the Contractor to meet and maintain the thresholds (including providing applicable training to available but unqualified potential personnel);

Any other factors the Contractor considers relevant in assisting the Employer to exercise its discretion under the provisions of paragraph 12.4 below; and

14.4. Waiver of Potential Penalties

14.4.1. After consideration of the Contractor's statement and such further information as the Employer may request, the Employer shall be entitled, at its sole discretion, to waive all or part of any applicable Penalty under the KPIs.

KARACHI BUS RAPID TRANSIT PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 - DRAFT CONTRACTS
SYSTEM CONTROL AND SERVICE PROVIDER
SECTION 7 – GENERAL CONDITIONS

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

Section VII. General Conditions (GC)

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General Conditions

A. Contract and Interpretation

1. Definitions

1.1 The following words and expressions shall have the meanings hereby assigned to them:

"ADB" means the Asian Development Bank.

“Adjudicator” means the person named in Appendix 2 (Adjudicator) of the Contract, or otherwise appointed by agreement between the Employer and the Contractor to make a decision on or to settle any dispute or difference between the Employer and the Contractor referred to him or her by the parties, pursuant to GC Clause 52 (Disputes and Arbitration).

“Agreed and Finalized Project Plan” means the project plan that has been approved by the Employer in accordance with GC Clause 19 (Project Planning and Performance) and is included at Appendix 8 of the Contract.

“Arbitration” means the application of judicial methods to the settlement of disputes.

“Bank” means ADB defined in the PC.

“Bidding Documents” refers to the collection of documents issued by the Employer to instruct and inform potential Contractors of the processes for bidding, selection of the winning bid, and Contract information, as well as the contractual conditions governing the relationship between the Employer and the Contractor.

“Borrower” means the government of the Employer’s Country and includes the Employer.

“Commissioning” means operation of the IT Products and/or Services or any part thereof by the Contractor following Completion, which operation is to be carried out by the Contractor as provided in GC Sub-Clause 27.1 (Commissioning) hereof, for the purpose of carrying out Operational Acceptance Test(s).

“Completion” means that the Facilities (or a specific part thereof where specific parts are specified in the Contract) have been completed operationally, that all work in respect of Pre-commissioning and Installation of the Facilities or such specific part thereof has been completed, that all Documentation has been supplied, and that the Facilities or specific part thereof are ready for Commissioning as provided in GC Clause 26 (Completion) hereof.

“Contract” means the contract entered into between the Employer and the Contractor, and constituted by the Contract Documents.

“Contract Documents” means the documents listed in Article 1.1 (Contract Documents) of the Contract (including any amendments thereto).

“Contract Period” is the time period during which this Contract governs the relations and obligations of the Employer and Contractor in relation to the IT Products and/or Services, as specified in the PC.

“Contract Price” means the sum specified in Article 2.1 (Contract Price) of the Contract, subject to such additions and adjustments thereto or deductions there from, as may be made pursuant to the Contract.

“Contractor” means the party named as the Contractor in the Contract, and includes the legal successors or permitted assigns of the Contractor.

“Contractor’s Country” is the country in which the Contractor is legally organized, as named in the Contract.

“Contractor’s Equipment” means all equipment, tools, apparatus, or things of every kind required in or for installation, completion and maintenance of the System that are to be provided by the Contractor, but excluding the IT Products and/or Services, or other items forming part of the System.

“Contractor’s Representative” means any person nominated by the Contractor and approved by the Employer in the manner provided in GC Clause 18 (Representatives) hereof to perform the duties delegated to the Contractor.

“Coverage Period” means the Days of the Week and the hours of those Days during which maintenance, operational and/or technical support services (if any) must be available.

“Custom Documentation” means Documentation identified as such in Appendix 5 of the Contract and such other Documentation as the parties may agree in writing to be Custom Documentation.

“Custom Software” means Software identified as such in Appendix 4 of the Contract and such other Software as the parties may agree in writing to be Custom Software.

“Day” means calendar day.

“Defect” means an imperfection or flaw that impairs worth or utility of the Product.

“Defect Liability Period” means the period of validity of the warranties given by the Contractor commencing at Commissioning of the Facilities or a part thereof, during which the Contractor is responsible for defects with respect to the Facilities (or the relevant part thereof) as provided in GC Clause 29 (Defect Liability) hereof.

“Delivery” means the transfer of the Products from the Contractor to the Employer in accordance with the current edition Incoterms specified in the Contract.

“Designated Operating Environment” means the particular hardware and software environment in which the Software is designed to be used, which environment is specified in the SOR.

“Documentation” means all documentation in printed or printable form and all instructional and informational aides in any form (including audio, video, and text) and on any medium, provided to the Employer under the Contract. See also Standard Documentation and Custom Documentation.

“Effective Date” means the date of fulfillment of all conditions specified in Article 3 (Effective Date) of the Contract, from which the Time for Completion shall be counted.

“Eligible Country” means the countries and territories eligible for participation in procurements financed by ADB as defined in the Procurement Guidelines.

“Employer” means the person named as such in the PC and includes the legal successors or permitted assigns of the Employer.

“Employer’s Country” means the country named in the PC.

“Facilities” means the Products to be supplied and installed, as well as all Installation Services to be carried out by the Contractor under the Contract.

“Functional Guarantees” means the guarantees specified in the Appendix to the Contract titled Functional Guarantees.

“GC” means the General Conditions.

“General-Purpose Software” means Software that supports general-purpose office and software development activities and is identified as such in Appendix 4 of the Contract and such other Software. Such General-Purpose Software may include, but is not restricted to, word processing, spreadsheet, generic database management, and application development software.

“Hardware” means all equipment, furnishings, and other tangible items outlined in the SOR that the Contractor is required to supply or to supply and install under the Contract, including, without limitation, the Products and/or Services and documentation, but excluding the Contractor’s Equipment.

“Implementation Schedule” means the Implementation Schedule as specified in the Agreed and Finalised Project Plan.

“Installation” means the preparation and placement of the System for use.

“Installation Services” means all Services required to achieve Installation.

“Intellectual Property Rights” means any and all copyright, moral rights, trademark, patent, and other intellectual and proprietary rights, title and interests worldwide, whether vested, contingent, or future, including without limitation all economic rights and all exclusive rights to reproduce, fix, adapt, modify, translate, create derivative works from, extract or re-utilize data from, manufacture, introduce into circulation, publish, distribute, sell, license, sublicense, transfer, rent, lease, transmit or provide access electronically, broadcast, display, enter into computer memory, or otherwise use any portion or copy, in whole or in part, in any form, directly or indirectly, or to authorize or assign others to do so.

“Month” means calendar month.

“Operational Acceptance” means the acceptance by the Employer of the Facilities (or any part of the Facilities where the Contract provides for acceptance of the Facilities in parts), which certifies the Contractor’s fulfillment of the Contract in respect of Functional Guarantees of the Facilities (or the relevant part thereof) in accordance with the provisions of GC Clause 30 (Functional Guarantees) hereof and shall include deemed acceptance in accordance with GC Clause 27 (Commissioning and Operational Acceptance) hereof.

“Operational Acceptance Certificate” or “Operational Acceptance Certification” means the written certification provided by the Employer to the Contractor after Operational Acceptance.

“Operational Acceptance Test” and “Operational Acceptance Testing” mean the process of determining whether the criteria for Operational Acceptance have been satisfied.

“Origin” means the place where the Products were produced or from which the Services are supplied. Products are produced when, through manufacturing, processing, software development, or substantial and major assembly or integration of components, a commercially recognized product results that is substantially different in basic characteristics or in purpose or utility from its components. The Origin of Products and Services is distinct from the nationality of the Contractor and may be different.

“Packaged Software” means the software Product, the subject of the Licene, specified in the SOR including any updates or new releases, modifications, enhancements, Documentation, flow charts, logic diagrams and listings.

“Party” means the Employer or the Contractor, as the context requires, and “Parties” means both of them.

“PC” means the Particular Conditions.

“Precommissioning” means the testing, checking and other requirements specified in the Schedule of Requirements that are to be carried out by the Contractor in preparation for Commissioning as provided in GC Clause 8 (Time for Commencement and Completion) hereof.

“Preventive Maintenance” means the care and servicing by personnel for the purpose of maintaining Hardware in satisfactory operating condition by providing for systematic inspection, detection, and correction of incipient failures either before they occur or before they develop into major defects. Preventive Maintenance is usually costed as a fixed fee over the maintenance period.

“Post-Warranty Services Period” means the number of years defined in the PC (if any), following the expiration of the Warranty Period during which the Contractor is obligated to provide Software licenses, maintenance, and/or technical support services for the System, either under this Contract or under separate contract(s).

“Procurement Guidelines” refers to the ADB *Procurement Guidelines*.

“Product” means a product deliverable specified in the Schedule of Requirements which is to be supplied to the Employer by or on behalf of the Contractor, including but not limited to all information processing and communications-related Hardware, Software, consumable items, plans and/or any supporting documentation, and including such integrations and configurations as are required to perform its function.

“Project Manager” means the person appointed by the Employer in the manner provided in GC Clause 18.1 (Representatives) hereof and named as such in the PC to perform the duties delegated by the Employer.

“Project Plan” means the set of tasks required to achieve Completion, Operational Acceptance and Commissioning, as described in the Agreed and Finalized Project Plan.

“Project Site(s)” means the place(s) specified in the PC for delivery of the IT Products and/or Services.

“Rental Items” means the Hardware rented or leased by the Employer from the Contractor under a lease agreement for a rental fee.

“Schedule of Requirements (SOR)” means the Schedule of Requirements Section of the Bidding Documents as amended and appended to the Contract including to the extent relevant, but not limited to, the following:

(a) Background and Procurement Objectives;
(b) Scope of works, including Technical Requirements;
(c) Agreed and Finalized Project Plan;
(d) Implementation Schedule;
(e) Service Level Agreement.

“Services” means all technical, logistical, management, consultancy and any other Services as specified in the Schedule of Requirements to be provided by the Contractor under the Contract to supply, install, customize, integrate, and make operational the Products provided. Such Services may include, but are not restricted to, activity management and quality assurance, design, development, customization, documentation, transportation, insurance, inspection, expediting, site preparation, Installation, integration, training, data migration, Pre-commissioning, Commissioning, maintenance, and technical support.

“Site” means the place(s) specified in the PC for Installation and Commissioning of the IT Products and/or Services.

“Software” means the items to be supplied under this Contract as specified at Appendix 4 to this Contract.

“Software Support Services” means the Services specified in the SOR to be provided by the Contractor to the Employer in respect of the Packaged Software.

“Source Code” means the database structures, dictionaries, definitions, program source files, and any other symbolic representations necessary for the compilation, execution, and subsequent maintenance of the Software (typically, but not exclusively, required for Custom Software).

“Standard Documentation” means all Documentation not specified as Custom Documentation.

“Standard Software” means Software identified as such in Appendix 4 of the Contract and such other Software as the parties may agree in writing to be Standard Software.

“Sub-Contractor” means any third-party provider with whom the Contractor contracts for the supply or execution of any part of the Products and/or Services to be provided by under the Contract and includes its legal successors or permitted assigns.

“System” or "Sub-system" means a combination of Products which are integrated so as to operate together.

“Time for Operational Acceptance” means the time within which Operational Acceptance of the Facilities as a whole (or of a part of the Facilities where a separate Time for Operational Acceptance of such part has been prescribed) is to be achieved, as referred to in GC Sub-Clause 27.2 (Operational Acceptance) and in accordance with the relevant provisions of the Contract.

“Time for Completion” means the time within which Completion of the Facilities as a whole (or of a part of the Facilities where a separate Time for Completion of such part has been prescribed) is to be attained, as referred to in GC Sub-Clause 8.2 (Time for Commencement and Completion) and in accordance with the relevant provisions of the Contract.

“Training Schedule” means the programme of training including dates and training topics to be provided by the Contractor to the Employer’s personnel.

“Warranty Period” means the period defined in the SOR by which the Contractor warrants its Products will remain defect-free, and any remediation of any defect that arises in this period will be the responsibility of the Contractor and costs of such remediation will be borne by the Contractor.

“Week” means seven (7) consecutive Days, beginning the day of the week as is customary in the Employer’s Country.

“Year” means 365 days.

2. Contract Documents

2.1 Subject to Article 1.2 (Order of Precedence) of the Contract, all documents forming part of the Contract (and all parts thereof) are intended to be correlative, complementary and mutually explanatory. The Contract shall be read as a whole.

2.2 In the event and to the extent of any inconsistency between two or more documents that form part of this Contract, those documents will be interpreted in the following order of precedence:

(a) Appendix 15 (Minutes of Contract Finalisation Discussions and Agreed Contract Amendments) attached to the Contract;

(b) the Contract and Appendices 1 to 7 and 9 to 14 attached to the Contract;

(c) the PC and its Appendices;

(d) all GCs (including documents incorporated by reference in these terms and conditions);

(e) Appendix 8 (Agreed and Finalized Project Plan) attached to the Contract;

(f) the Contractor's bid and original Price Schedules; and

(g) the remaining appendixes to these GCs (including documents incorporated by reference in any Appendix).

3. Interpretation

3.1 In the Contract, except where the context requires otherwise:

(a) words indicating one gender include all genders;

(b) words indicating the singular also include the plural and words indicating the plural also include the singular;

(c) provisions including the word "agree", "agreed" or "agreement" require the agreement to be recorded in writing;

(d) "written" or "in writing" means hand-written, type-written, printed or electronically made, and resulting in a permanent record.

The marginal words and other headings shall not be taken into consideration in the interpretation of these Conditions.

3.2 Incoterms

Unless inconsistent with any provision of the Contract, the meaning of any trade term and the rights and obligations of Parties thereunder shall be as prescribed by Incoterms.

Incoterms means international rules for interpreting trade terms published by the International Chamber of Commerce (latest edition), 38 Cours Albert 1er, 75008 Paris, France.

3.3 Entire Agreement

Subject to GC Sub-Clause 17.6 hereof, the Contract constitutes the entire agreement between the Employer and Contractor with respect to the subject matter of Contract and supersedes all communications, negotiations and agreements (whether written or oral) of Parties with respect thereto made prior to the date of Contract.

3.4 Amendment

No amendment or other variation of the Contract shall be effective unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized representative of each Party hereto.

3.5 Independent Contractor

The Contractor shall be an independent contractor performing the Contract. The Contract does not create any agency, partnership, joint venture or other joint relationship between the Parties hereto. Subject to the provisions of the Contract, the Contractor shall be solely responsible for the manner in which the Contract is performed. All employees, representatives or Sub-Contractors engaged by the Contractor in connection with the performance of the Contract shall be under the complete control of the Contractor and shall not be deemed to be employees of the Employer, and nothing contained in the Contract or in any subcontract awarded by the Contractor shall be construed to create any contractual relationship between any such employees, representatives or Sub-Contractors and the Employer.

3.6 Non-Waiver

3.6.1 Subject to GC Sub-Clause (b) below, no relaxation, forbearance, delay or indulgence by either Party in enforcing any of the terms and conditions of the Contract or the granting of time by either Party to the other shall prejudice, affect or restrict the rights of that Party under the Contract, nor shall any waiver by either Party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.

3.6.2 Any waiver of a Party’s rights, powers or remedies under the Contract must be in writing, must be dated and signed by an authorized representative of the Party granting such waiver, and must specify the right and the extent to which it is being waived.

3.7 Severability

If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable, such prohibition, invalidity or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Contract.

4. Communications

4.1 Wherever these General Conditions provide for the giving or issuing of approvals, certificates, consents, determinations, notices, requests and discharges, these communications shall be:

(a) in writing and delivered against receipt; and

(b) delivered, sent or transmitted to the address for the recipient’s communications as stated in the Contract.

4.2 When a certificate is issued to a Party, the certifier shall send a copy to the other Party. When a notice is issued to a Party, by the other Party or the Project Manager, a copy shall be sent to the Project Manager or the other Party, as the case may be.

4.3 Communications shall be deemed to include any approvals, consents, instructions, orders, and certificates to be given under the Contract.

5. Law and Language

5.1 The Contract shall be governed by and interpreted in accordance with laws of the country specified in the PC.

5.2 The ruling language of the Contract shall be that stated in the PC.

5.3 The language for communications shall be the ruling language unless otherwise stated in the PC.

6. Fraud and Corruption

6.1 ADB's Anticorruption Policy requires Borrowers (including beneficiaries of ADB-financed activity), as well as Bidders, Suppliers, and Contractors under ADB-financed contracts, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, ADB

(a) defines, for the purposes of this provision, the terms set forth below as follows:

(i) "corrupt practice" means the offering, giving, receiving, or soliciting, directly or indirectly, anything of value to influence improperly the actions of another party;

(ii) "fraudulent practice" means any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;

(iii) "coercive practice" means impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;

(iv) "collusive practice" means an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party;

(v) "obstructive practice" means (a) deliberately destroying, falsifying, altering, or concealing of evidence material to an ADB investigation; (b) making false statements to investigators in order to materially impede an ADB investigation; (c) failing to comply with requests to provide information, documents, or records in connection with an Office of Anticorruption and Integrity (OAI) investigation; (d) threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or (e) materially impeding ADB's contractual rights of audit or access to information; and

(vi) "integrity violation" is any act which violates ADB's Anticorruption Policy, including (i) to (v) above and the following: abuse, conflict of interest, violations of ADB sanctions, retaliation against whistleblowers or witnesses, and other violations of ADB's Anticorruption Policy, including failure to adhere to the highest ethical standard.

(b) will reject a proposal for award if it determines that the Bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations in competing for the Contract;

(c) will cancel the portion of the financing allocated to a contract if it determines at any time that representatives of the borrower or of a beneficiary of ADB-financing engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations during the procurement or the execution of that contract, without the borrower having taken timely and appropriate action satisfactory to ADB to remedy the situation; and

(d) will impose remedial actions on a firm or an individual, at any time, in accordance with ADB's Anticorruption Policy and Integrity Principles and Guidelines (both as amended from time to time), including declaring ineligible, either indefinitely or for a stated period of time, to participate[1] in ADB-financed, -administered, or -supported activities or to benefit from an ADB-financed, -administered, or -supported contract, financially or otherwise, if it at any time determines that the firm or individual has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations.

6.2 The Supplier shall permit ADB to inspect the Supplier's accounts and records relating to the performance of the Supplier and to have them audited by auditors appointed by ADB, if so required by ADB.

B. Subject Matter of Contract

7. Scope of Facilities

7.1 Unless otherwise expressly limited in the SOR, the Contractor shall:

(a) provide the Products and Services as specified in the SOR;

(b) be responsible for timely provision of all resources, information, and decision making under its control that are necessary to reach a mutually Agreed and Finalized Project Plan pursuant to GC Clause 19 (Project Planning and Performance) within the time schedule specified in the Implementation Schedule. Failure to provide such resources, information, and decision making may constitute grounds for termination pursuant to GC Clause 47 (Termination for Contractor's Default);

(c) provide all Documentation and Products as well as the performance of all Products and Services, in accordance with the plans, procedures, specifications, drawings, codes, and any other documents specified in the SOR and/or the Agreed and Finalized Project Plan;

(d) unless specifically excluded in the Contract, perform all such work and/or supply all such items and materials not specifically mentioned in the Contract but that can be reasonably inferred from the Contract as being required for attaining Completion of the Products and Services as if such work and/or items and materials were expressly mentioned in the Contract; and

(e) provide Products and Services as implied by the Recurrent Cost Form of the Contractor's bid, such as consumables, spare parts, and technical services (e.g., maintenance, technical assistance, and operational support), such as are specified in the SOR, including the relevant terms, characteristics, and timings.

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[1] Whether as a Contractor, Subcontractor, Consultant, Manufacturer or Supplier, or Service Provider; or in any other capacity (different names are used depending on the particular Bidding Document).

8. Time for Commencement and Completion

8.1 The Contractor shall commence work on the Facilities within the period specified in the PC and without prejudice to GC Sub-Clause 26.2 (Completion) hereof, the Contractor shall thereafter proceed with the Facilities in accordance with the time schedule specified in the Implementation Schedule and any refinements made in the Agreed and Finalized Project Plan.

8.2 The Contractor shall attain Completion of the Facilities or of a part where a separate time for Completion of such part is specified in the Contract, within the time stated in the PC or within such extended time to which the Contractor shall be entitled under GC Clause 44 (Extension of Time for Completion) hereof.

9. Contractor's Responsibilities

9.1 The Contractor shall conduct all activities with due care and diligence, in accordance with the Contract and with the skill and care expected of a competent provider of IT Products and/or Services, information systems, support, maintenance, training, and other related services, or in accordance with best industry practices. When completed, the IT Products and/or Services should be fit for the purposes for which they are intended as defined in the Contract.

9.2 The Contractor confirms that it has entered into this Contract on the basis of a proper examination of the Employer's existing equipment, installations and including reviewing any hardware, software and data interfaces as provided by the Employer, and on the basis of information that the Contractor could have obtained from a visual inspection of the Site if access thereto was available and of other data readily available to it relating to the Facilities as of the date twenty-eight (28) days prior to bid submission. The Contractor acknowledges that any failure to acquaint itself with all such data and information shall not relieve its responsibility for properly estimating the difficulty or cost of successfully performing the Contract.

9.3 The Contractor shall acquire and pay for all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located which such authorities or undertakings require the Contractor to obtain in its name and which are necessary for the performance of the Contract, including, without limitation, visas for the Contractor's and Sub-Contractor's personnel and entry permits for all imported Contractor's Equipment. The Contractor shall acquire all other permits, approvals and/or licenses that are not the responsibility of the Employer under GC Clause 10 hereof and that are necessary for the performance of the Contract.

9.4 The Contractor shall comply with all laws in force in the country where the IT Products and/or Services are to be installed. The laws will include all local, state, national or other laws that affect the performance of the Contract and bind upon the Contractor. The Contractor shall indemnify and hold harmless the Employer from and against any and all liabilities, damages, claims, fines, penalties and expenses of whatever nature arising or resulting from the violation of such laws by the Contractor or its personnel, including the Sub-Contractors and their personnel, but without prejudice to GC Clause

10 (Employer's Responsibilities) hereof.

9.5 Any IT Products and/or Services that will be incorporated in or be required for the Facilities and other supplies shall have as their origin an Eligible Country. Any Sub-Contractors retained by the Contractor shall have as their origin an Eligible Country

9.6 The Contractor shall permit ADB to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by ADB, if so required by ADB.

9.7 If the Contractor is a joint venture or consortium of two or more parties, all such parties shall be jointly and severally bound to the Employer for the fulfillment of the provisions of the Contract and shall designate one of such parties to act as a leader with authority to bind the joint venture or consortium. The composition or the constitution of the joint venture or consortium shall not be altered without the prior consent of the Employer.

9.8 The Contractor shall, in all dealings with its labor and the labor of its Sub-Contractors currently employed on or connected with the Contract, pay due regard to all recognized festivals, official holidays, religious or other customs, and all local laws and regulations pertaining to the employment of labor.

9.9 Other Contractor responsibilities, if any, are as stated in the SOR.

10. Employer's Responsibilities

10.1 The Employer shall ensure the accuracy of all information and/or data to be supplied by the Employer to the Contractor, except when otherwise expressly stated in the Contract.

10.2 The Employer shall be responsible for timely provision of all resources, information, and decision making under its control that are necessary to reach an Agreed and Finalized Project Plan (pursuant to GC Sub-Clause 19.2 (Project Planning and Performance) within the time schedule specified in the Implementation Plan in the SOR. Failure to provide such resources, information, and decision making may constitute grounds for termination pursuant to GC Clause 48 (Termination by Contractor).

10.3 The Employer shall be responsible for acquiring and providing legal and physical possession of the Site and access to it, and for providing possession of and access to all other areas reasonably required for the proper execution of the Contract.

10.4 The Employer shall acquire and pay for all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located which (a) such authorities or undertakings require the Employer to obtain in the Employer's name, (b) are necessary for the execution of the Contract, including those required for the performance by both the Contractor and the Employer of their respective obligations under the Contract, and (c) are specified in the SOR.

10.5 If requested by the Contractor, the Employer shall use its best endeavors to assist the Contractor in obtaining in a timely and expeditious manner all permits, approvals and/or licenses necessary for the execution of the Contract from all local, state or national government authorities or public service undertakings that such authorities or undertakings require the Contractor or Sub-Contractors or the personnel of the Contractor or Sub-Contractors, as the case may be, to obtain.

10.6 In such cases where the responsibilities of specifying and acquiring or upgrading telecommunications and/or electric power services falls to the Contractor, as specified in the SOR, PC, Agreed and Finalized Project Plan, or other parts of the Contract, the Employer shall use its best endeavors to assist the Contractor in obtaining such services in a timely and expeditious manner.

10.7 The Employer shall be responsible for timely provision of all resources, access, and information necessary for the provision of the IT Products and/or Services (including, but not limited to, any required telecommunications or electric power services), as identified in the Agreed and Finalized Project Plan, except where provision of such items is explicitly identified in the Contract as being the responsibility of the Contractor. Delay by the Employer may result in an appropriate extension of the Time for Operational Acceptance, at the Contractor’s discretion.

10.8 Unless otherwise specified in the Contract or agreed upon by the Employer and the Contractor, the Employer shall provide sufficient, properly qualified operating and technical personnel as required by the Contractor to properly carry out the provision of the IT Products and/or Services at or before the time specified in the Implementation Schedule and the Agreed and Finalized Project Plan.

10.9 The Employer will designate appropriate staff for the training courses to be given by the Contractor and shall make all appropriate logistical arrangements for such training as specified in the SOR, PC, the Agreed and Finalized Project Plan, or other parts of the Contract.

10.10 The Employer assumes primary responsibility for the Operational Acceptance Test(s) for the IT Products and/or Services, in accordance with GC Sub-Clause 27.2 (Operational Acceptance Test), and shall be responsible for the continued operation of the Products after Operational Acceptance. However, this shall not limit in any way the Contractor’s responsibilities after the date of Operational Acceptance otherwise specified in the Contract.

10.11 During the development of the Products and/or Services, the Contractor is responsible for performing and safely storing timely and regular backups of its data and Software in accordance with accepted data management principles. Following Commissioning and Acceptance, the Employer is responsible for backups.

10.12 All costs and expenses involved in the performance of the obligations under this GC Clause 10 shall be the responsibility of the Employer, save those to be incurred by the Contractor with respect to the performance of the Operational Acceptance Test(s), in accordance with GC Sub-Clause 27.2.

10.13 In the event that the Employer shall be in breach of any of its obligations under this Clause, the additional cost incurred by the

Contractor in consequence thereof shall be determined by the Project Manager and added to the Contract Price.

10.14 Other Employer responsibilities, if any, are as stated in the SOR.

C. Payment

11. Contract Price

11.1 The Contract Price shall be as specified in Article 2 (Contract Price and Terms of Payment) of the Contract.

11.2 Unless an adjustment clause is provided for in the PC, the Contract Price shall be a firm lump sum not subject to any alteration, except in the event of a Change in the SOR or as otherwise provided in the Contract.

11.3 Subject to GC Sub-Clauses 9.2, 10.1 and 39 (Unforeseen Conditions) hereof, the Contractor shall be deemed to have satisfied itself as to the correctness and sufficiency of the Contract Price, which shall, except as otherwise provided for in the Contract, cover all its obligations under the Contract.

12. Terms of Payment

12.1 The Contractor's request for payment shall be made to the Employer in writing, accompanied by

(a) an invoice describing, as appropriate,

  (a) the IT Products and/or Services provided;

  (b) when the IT Products and/or Services were supplied and (if applicable) accepted; and

  (c) the amount payable in respect of each item, and

(b) documents submitted pursuant to GC Sub-Clause 22.5 (Transport and Delivery) and upon fulfillment of other obligations stipulated in the Contract.

12.2 The Contract Price shall be paid as specified in Appendix 7 (Terms and Procedures of Payment) to the Contract.

12.3 No payment made by the Employer herein shall be deemed to constitute acceptance by the Employer of the IT Products and/or Services or any part(s) thereof.

12.4 Payments shall be made promptly by the Employer, but in no case later than forty-five (45) days after submission of a valid invoice by the Contractor. In the event that the Employer fails to make any payment by its respective due date or within the period set forth in the Contract, the Employer shall pay to the Contractor interest on the amount of such delayed payment at the rate(s) specified in Appendix 7 (Terms and Procedures of Payment) to the Contract for the period of delay until payment has been made in full, whether before or after judgment or arbitration award.

12.5 All payments shall be made in the currency(ies) specified in the Contract, pursuant to GC Clause 11. For IT Products and/or Services supplied locally, payments shall be made in the currency of the Employer's Country, unless otherwise specified in Appendix 7 (Terms and Procedures of Payment) to the Contract.

12.6 Unless otherwise specified in Appendix 7 (Terms and Procedures of Payment), to the Contract, payment of the foreign currency portion of the Contract Price for Products supplied from outside the Employer's Country shall be made to the Contractor through the irrevocable letter of credit opened by an authorized bank in the Contractor's Country and will be payable on presentation of the appropriate documents. It is agreed that the letter of credit will be subject to Article 10 of the latest revision of Uniform Customs and Practice for Documentary Credits, published by the International Chamber of Commerce, Paris.

13. Securities

13.1 Issuance of Securities
The Contractor shall provide the securities specified below in favor of the Employer at the times, and in the amount, manner and form specified below.

13.2 Advance Payment Security

(a) If specified in the PC, the Contractor shall, within twenty-eight (28) days of the notification of Contract award, provide a security equal in the amount and currency to the advance payment, and valid until the IT Products and/or Services achieve Operational Acceptance.

(b) The security shall be in the form provided in the Bidding Documents or in another form acceptable to the Employer. The amount of the security shall be reduced in proportion to the value of the IT Products and/or Services executed by and paid to the Contractor from time to time, and shall automatically become null and void when the full amount of the advance payment has been recovered by the Employer. The way the value of the security is deemed to become reduced and, eventually, voided is as specified in the PC. The security shall be returned to the Contractor immediately after its expiration.

13.3 Performance Security

(a) The Contractor shall, within twenty-eight (28) days of the notification of Contract award, provide a security for the due performance of the Contract in the amount specified in the PC.

(b) The security shall be a bank guarantee in the form provided in Section IX (Contract Forms) or it shall be in another form acceptable to the Employer.

(c) The performance security shall automatically become null and void once all the obligations of the Contractor under the Contract have been fulfilled, including, but not limited to, any obligations during the Warranty Period and any extensions to the period. The security shall be returned to the Contractor no later than twenty-eight (28) days after its expiration.

(d) Upon Operational Acceptance of the IT Products and/or Services, the security shall be reduced to the amount specified in the PC, on the date of such Operational Acceptance, so that the reduced security would only cover the remaining warranty obligations of the Contractor.

(e) The Employer shall not make a claim under the performance security, except for amounts to which the Employer is entitled under the Contract. The Employer shall indemnify and hold the Contractor harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from a claim under the performance security to the extent to which the Employer was not entitled to make the claim.

14. Taxes and Duties

14.1 For IT Products and/or Services supplied from outside the Employer's country, the Contractor shall be entirely responsible for all taxes, stamp duties, license fees, and other such levies, payable in the Employer's country. Any duties, such as importation or customs duties, and taxes and other levies, payable in the Employer's country for the supply of Products and Services from outside the Employer's country are the responsibility of the Employer unless these duties or taxes have been made part of the Contract Price in Article 2 of the Contract and the Price Schedule to which it refers, in which case the duties and taxes will be the Contractor's responsibility.

14.2 For IT Products and/or Services supplied locally, the Contractor shall be entirely responsible for all taxes, duties, license fees, etc., incurred until delivery of the contracted Products or Services to the Employer. The only exceptions are taxes or duties, such as value-added or sales tax or stamp duty as apply to, or are clearly identifiable, on the invoices and provided they apply in the Employer's country, and only if these taxes, levies and/or duties are also excluded from the Contract Price in Article 2 of the Contract and the Price Schedule to which it refers.

14.3 If any tax exemptions, reductions, allowances or privileges may be available to the Contractor in the country where the Site is located, the Employer shall use its best endeavors to enable the Contractor to benefit from any such tax savings to the maximum allowable extent.

14.4 For the purpose of the Contract, it is agreed that the Contract Price specified in Article 2 (Contract Price and Terms of Payment) of the Contract is based on the taxes, duties, levies and charges prevailing at the date twenty-eight (28) days prior to the date of bid submission in the country where the Site is located (hereinafter called "Tax" in this GC Sub-Clause 14.4). If any rates of Tax are increased or decreased, a new Tax is introduced, an existing Tax is abolished, or any change in interpretation or application of any Tax occurs in the course of the performance of Contract, which was or will be assessed on the Contractor, Sub-Contractors or their employees in connection with performance of the Contract, an equitable adjustment of the Contract Price shall be made to fully take into account any such change by addition to the Contract Price or deduction therefrom, as the case may be, in accordance with GC

Clause 40 (Change in Laws and Regulations) hereof.

D. Intellectual Property

15. Intellectual Property and Copyright

15.1 The Intellectual Propery Rights in all IT Products and/or Services Documentation and Software shall remain vested in the owner of such rights where it existed prior to commencement of this Contract.

15.2 The Employer agrees to restrict use, copying, or duplication of any Hardware, Software and Documentation, except that additional copies of Documentation may be made by the Employer for use within the scope of the project, in the event that the Contractor does not deliver copies within twenty-eight (28) days from receipt of a request for such Documentation.

15.3 The Employer's contractual rights to use the Standard Software or elements of the Standard Software may not be assigned, licensed, or otherwise transferred voluntarily except in accordance with the relevant license agreement or as may be otherwise specified in the PC.

15.4 As applicable, the Employer's and Contractor's rights and obligations with respect to Custom Software or elements of the Custom Software, including any license agreements, and with respect to Custom Documentation or elements of the Custom Documentation, are specified in the PC. Subject to the PC, the Intellectual Property Rights in all Custom Software and Custom Documentation specified in Appendices 4 and 5 of the Contract (if any) shall, at the date of this Contract or on creation of the rights (if later than the date of this Contract), vest in the Employer. The Contractor shall do and execute or arrange for the doing and executing of each necessary act, document, and thing that the Employer may consider necessary or desirable to perfect the right, title, and interest of the Employer in and to those rights. In respect of such Custom Software and Custom Documentation, the Contractor shall ensure that the holder of a moral right in such an item does not assert it, and the Contractor shall, if requested to do so by the Employer and where permitted by applicable law, ensure that the holder of such moral right waives it.

15.5 The parties shall enter into such (if any) escrow arrangements in relation to the Source Code for some or all of the Software as are specified in the PC.

16. Software Services and License Agreements

16.1 Except to the extent that the Intellectual Property Rights in the Software vest in the Employer, the Contractor hereby grants to the Employer license to access and use the Software, including all inventions, designs, and marks embodied in the Software.

Such license to access and use the Software shall:

(a) be:

- (i) nonexclusive;
- (ii) fully paid up and irrevocable (except that it shall terminate if the Contract terminates under GC Clause

46);

(iii) valid throughout the territory of the Employer’s Country (or such other territory as specified in the PC); and

(iv) subject to additional restrictions (if any) as specified in the PC,

(b) permit the Software to be:

(i) used or copied for use on or with the computer(s), users or environment(s) for which it was acquired (as specified in the SOR and/or Contractor’s bid), plus a backup of the same or similar capacity. Such backup shall be used if the primary is(are) inoperative, and during a reasonable transitional period when use is being transferred between primary and backup;

(ii) as specified in the PC, used or copied for use on or transferred to a replacement computer(s) or users (and use on the original and replacement computer(s) users or environment(s) may be simultaneous during a reasonable transitional period) provided that, if the SOR and/or Contractor’s bid specifies a class of computer, user or environment to which the license is restricted and unless the Contractor agrees otherwise in writing, the replacement computer(s) is(are) within that class;

(iii) if the nature of the Products is such as to permit such access, accessed from other computers connected to the primary and/or backup computer(s) by means of a local or wide-area network or similar arrangement, and used on or copied for use on those other computers to the extent necessary to that access;

(iv) reproduced for safekeeping or backup purposes;

(v) customized, adapted, or combined with other computer software for use by the Employer, provided that derivative software incorporating any substantial part of the delivered, restricted Software shall be subject to same restrictions as are set forth in this Contract;

(vi) as specified in the PC, disclosed to, and reproduced for use by, support service contractors and their subcontractors, (and the Employer may sublicense such persons to use and copy for use the Software) to the extent reasonable necessary to the performance of their support service contracts, subject to the same restrictions as are set forth in this Contract; and

(vii) disclosed to, and reproduced for use by, the Employer and by such other persons as are specified in the PC (and the Employer may sublicense such persons to use and copy for use the Software), subject to the same restrictions as are set forth in this Contract.

16.2 The Standard Software may be subject to audit by the Contractor, in accordance with the terms specified in the PC, to verify compliance with the above license agreements.

16.3 The Employer will require the Contractor to meet the mandatory requirements for Licensing Agreements as specified in the SOR.

17. Confidential Information

17.1 The Employer ("the Disclosing Party") and the Contractor ("the Receiving Party") shall keep confidential and shall not, without the written consent of the other Party hereto, divulge to any third Party any documents, data or other information furnished directly or indirectly by the other Party hereto in connection with the Contract (Confidential Information), whether such information has been furnished prior to, during or following termination of the Contract.

17.2 For the purposes of GC Sub-Clause 17.1, the Contractor is also deemed to be the Receiving Party of Confidential Information generated by the Contractor itself in the course of the performance of its obligations under the Contract and relating to the businesses, finances, contractors, employees, or other contracts of the Employer or the Employer's use of the IT Products and/or Services.

17.3 Notwithstanding GC Sub-Clauses 17.1 and 17.2:

(a) the Contractor may furnish to its Sub-Contractor Confidential Information of the Employer to the extent reasonably required for the Sub-Contractor to perform its work under the Contract; and

(b) the Employer may furnish Confidential Information of the Contractor: (i) to support service contractors and their sub-contractors to the extent reasonably required for them to perform their work under their support service contracts; and (ii) to its affiliates and subsidiaries,

in which event the Receiving Party shall ensure that the person to whom it furnishes Confidential Information of the Disclosing Party is aware of and abides by the Receiving Party's obligations under this GC Clause 17 as if that person were party to the Contract in place of the Receiving Party.

17.4 The Employer shall not, without the Contractor's prior written consent, use any Confidential Information received from the Contractor for any purpose other than the operation, maintenance and further development of the IT Products and/or Services. Similarly, the Contractor shall not, without the Employer's prior written consent, use any Confidential Information received from the Employer for any purpose other than those that are required for the performance of the Contract.

17.5 The obligation of a party under GC Sub-Clauses 17.1 through 17.4 above, however, shall not apply to that information which:

(a) now or hereafter enters the public domain through no fault of the Receiving Party;

(b) can be proven to have been possessed by the Receiving Party at the time of disclosure and that was not previously obtained, directly or indirectly, from the Disclosing Party;

(c) otherwise, lawfully becomes available to the Receiving Party from a third party that has no obligation of confidentiality.

17.6 The above provisions of this GC Clause 17 shall not in any way modify any undertaking of confidentiality given by either of the parties to this Contract prior to the date of the Contract in respect of the System or any part thereof.

17.7 The provisions of this GC Clause 17 shall survive the termination, for whatever reason, of the Contract for three (3) Years.

E. Execution of the Facilities

18. Representatives

18.1 Project Manager

If the Project Manager is not named in the Contract, then within fourteen (14) days of the Effective Date, the Employer shall appoint and notify the Contractor in writing of the name of the Project Manager. The Employer may from time to time appoint some other person as the Project Manager in place of the person previously so appointed, and shall give a notice of the name of such other person to the Contractor without delay. No such appointment shall be made at such a time or in such a manner as to impede the progress of work on the Facilities. Such appointment shall only take effect upon receipt of such notice by the Contractor. The Project Manager shall represent and act for the Employer at all times during the performance of the Contract. All notices, instructions, orders, certificates, approvals and all other communications under the Contract shall be given by the Project Manager, except as herein otherwise provided.

All notices, instructions, information and other communications given by the Contractor to the Employer under the Contract shall be given to the Project Manager, except as herein otherwise provided.

18.2 Contractor’s Representative

18.2.1 If the Contractor’s Representative is not named in Appendix 1 (Contractor’s Representative) of the Contract, then within fourteen (14) days of the Effective Date, the Contractor shall appoint the Contractor’s Representative and shall request the Employer in writing to approve the person so appointed. The request must be accompanied by a detailed curriculum vitae for the nominee, as well as description of any other responsibilities the nominee would retain while performing the duties of the Contractor’s Representative. If the Employer does not object to the appointment within fourteen (14) days, the Contractor’s Representative shall be deemed to have been approved. If the Employer objects to the appointment within fourteen (14) days giving the reason therefore, then the Contractor shall appoint a replacement within fourteen (14) days of such objection, in accordance with this GC Sub-Clause 18.2.1.

18.2.2 Subject to the extensions and/or limitations specified in the

SOR (if any), the Contractor's Representative shall have the authority to represent the Contractor on all day-to-day matters relating to the System or arising from the Contract. The Contractor's Representative shall give to the Project Manager all the Contractor's notices, instructions, information, and all other communications under the Contract.

18.3 All notices, instructions, information and all other communications given by the Employer or the Project Manager to the Contractor under the Contract shall be given to the Contractor's Representative or, in its absence, its deputy, except as otherwise provided for in this Contract.

18.3.1 The Contractor shall not revoke the appointment of the Contractor's Representative without the Employer's prior written consent, which shall not be unreasonably withheld. If the Employer consents to such an action, the Contractor shall appoint another person of equal or superior qualifications as the Contractor's Representative, pursuant to the procedure set out in GC Sub-Clause 18.2.1.

18.3.2 The Contractor's Representative and staff are obliged to work closely with the Project Manager and staff, act within their own authority, and abide by directives issued by the Employer that are consistent with the terms of the Contract. The Contractor's Representative is responsible for managing the activities of its personnel and any subcontracted personnel.

18.3.3 The Contractor's Representative may, subject to the approval of the Employer (which shall not be unreasonably withheld), at any time delegate to any person any of the powers, functions and authorities vested in him or her. Any such delegation may be revoked at any time. Any such delegation or revocation shall be subject to a prior notice signed by the Contractor's Representative, and shall specify the powers, functions and authorities thereby delegated or revoked. No such delegation or revocation shall take effect unless and until a copy thereof has been delivered to the Employer and the Project Manager.

18.3.4 Any act or exercise by any person of powers, functions and authorities so delegated to him or her in accordance with this GC Sub-Clause 18.3(d) shall be deemed to be an act or exercise by the Contractor's Representative.

18.4 Objections and Removals

18.4.1 The Employer may by notice to the Contractor object to any representative or person employed by the Contractor in the execution of the Contract who, in the reasonable opinion of the Employer, may have behaved inappropriately, be incompetent, or be negligent. The Employer shall provide evidence of the same, whereupon the Contractor shall remove such person from work on the System.

18.4.2 If any representative or person employed by the Contractor is removed in accordance with GC Sub-Clause (a) above, the Contractor shall, where required, promptly appoint a replacement.

19. Project Planning and Performance

19.1 If specified in the SOR, the Contractor shall develop, in close cooperation with the Employer, and based on the Preliminary Project Plan included in the Contractor's bid, an Agreed and Finalized Project Plan encompassing the activities specified in the SOR.

19.2 The Agreed and Finalized Project Plan will be prepared by the Contractor and approved by the Employer in accordance with the procedure specified in the SOR.

19.3 If required, the impact on the Implementation Schedule of modifications agreed during finalization of the Agreed and Finalized Project Plan shall be incorporated in the Contract by amendment, in accordance with GC Clause 44 (Extension Time for Completion).

19.4 The Contractor shall undertake to supply, install, test, and commission the IT Products and/or Services in accordance with the SOR and Agreed and Finalized Project Plan.

19.5 The progress report and other reports specified in the SOR shall be prepared by the Contractor and submitted to the Employer in the format and frequency specified in the SOR.

19.6 If at any time the Contractor's actual progress falls behind the project schedule described in the Agreed and Finalized Project Plan, or it becomes apparent that it will so fall behind, the Contractor shall, at the request of the Employer or the Project Manager, prepare and submit to the Project Manager a revised project schedule, taking into account the prevailing circumstances, and shall notify the Project Manager of the steps being taken to expedite progress so as to attain Completion of the Facilities within the Time for Completion under GC Sub-Clause 8.2, any extension thereof entitled under GC Sub-Clause 44.1 (Extension of Time for Completion), or any extended period as may otherwise be agreed upon between the Employer and the Contractor.

20. Subcontracting

20.1 Appendix 3 (List of Approved Sub-Contractors) to the Contract specifies critical items of supply or services and a list of Sub-Contractors for each item that are considered acceptable by the Employer. If no Sub-Contractors are listed for an item, the Contractor shall prepare a list of Sub-Contractors it considers qualified and wishes to be added to the list for such items. The Contractor may from time to time propose additions to or deletions from any such list. The Contractor shall submit any such list or any modification to the list to the Employer for its approval in sufficient time so as not to impede the progress of work on the System. The Employer shall not withhold such approval unreasonably. Such approval by the Employer of a Sub-Contractor(s) shall not relieve the Contractor from any of its obligations, duties, or responsibilities under the Contract.

20.2 The Contractor may, at its discretion, select and employ Sub-Contractors for such critical items from those Sub-Contractors listed pursuant to GC Sub-Clause 20.1. If the Contractor wishes to employ a Sub-Contractor not so listed, or subcontract an item not so listed, it must seek the Employer's prior approval under GC Sub-Clause 20.3.

20.3 For items for which pre-approved Sub-Contractor lists have not been specified in Appendix 3 to the Contract, the Contractor may employ such Sub-Contractors as it may select, provided: (i) the Contractor notifies the Employer in writing at least twenty-eight (28) days prior to the proposed mobilization date for such Sub-Contractor; and (ii) by the end of this period either the Employer has granted its approval in writing or fails to respond. The Contractor shall not engage any Sub-Contractor to which the Employer has objected in writing prior to the end of the notice period. The absence of a written objection by the Employer during the above specified period shall constitute formal acceptance of the proposed Sub-Contractor. Except to the extent that it permits, the deemed approval of the Employer of Sub-Contractors not listed in the Contract, nothing in this Clause, however, shall limit the rights and obligations of either the Employer or Contractor as they are specified in GC Sub-Clauses 20.1 and 20.2 or in Appendix 3 of the Contract.

20.4 Each sub-contract shall include provisions which would entitle the Employer to require the sub-contract to be assigned to the Employer under GC Sub-Clause 20.5 (if and when applicable), or in event of termination by the Employer under GC Clause 46.

20.5 If a Sub-Contractor's obligations extend beyond the expiry date of the relevant Defect Liability Period and the Project Manager, prior to that date, instructs the Contractor to assign the benefits of such obligations to the Employer, then the Contractor shall do so.

21. Design and Engineering

21.1 Technical Specifications and Drawings

21.1.1 The Contractor shall execute the basic and detailed design and the implementation activities necessary for successful provision of the IT Products and/or Services in compliance with the provisions of the Contract or, where not so specified, in accordance with good industry practice.

The Contractor shall be responsible for any discrepancies, errors or omissions in the specifications, drawings and other technical documents that it has prepared, whether such specifications, drawings, and other documents have been approved by the Project Manager or not, provided that such discrepancies, errors, or omissions are not because of inaccurate information furnished in writing to the Contractor by or on behalf of the Employer.

21.1.2 The Contractor shall be entitled to disclaim responsibility for any design, data, drawing, specification, or other document, or any modification of such design, drawings, specification, or other documents provided or designated by or on behalf of the Employer, by giving a notice of such disclaimer to the Project Manager.

21.2 Codes and Standards

Wherever references are made in the Contract to codes and standards in accordance with which the Contract shall be executed, the edition or the revised version of such codes and standards current at the date twenty-eight (28) days prior to date of bid submission shall apply unless otherwise specified in the SOR. During Contract execution, any changes in such codes and standards shall be applied after approval by the Employer and shall be treated in accordance with GC Sub-Clause 43.3 (Changes Originating From Contractor).

21.3 Approval/Review of Technical Documents by Project Manager

21.3.1 The Contractor shall prepare or cause its Sub-Contractors to prepare, and furnish to the Project Manager the documents listed in the Appendix to the Contract titled List of Documents for Approval or Review, for its approval or review as specified and in accordance with the requirements of GC Sub-Clause 19.1.

21.3.2 Any part of the IT Products and/or Services covered by or related to the documents to be approved by the Project Manager shall be executed only after the Project Manager’s approval thereof.

21.3.3 GC Sub-Clause 21.5 shall apply to those documents requiring the Project Manager’s approval, but not to those furnished to the Project Manager for its review only.

21.4 Any part of the IT Products and/or Services covered by or related to the documents to be approved by the Project Manager shall be executed only after the Project Manager’s approval of these documents.

21.5 GC Sub-Clauses 21.3.2 through 21.3.3 shall apply to those documents requiring the Project Manager’s approval, but not to those furnished to the Project Manager for its review only.

21.5.1 Within fourteen (14) days after receipt by the Project Manager of any document requiring the Project Manager’s approval in accordance with GC Sub-Clause 21.4, the Project Manager shall either return one copy of the document to the Contractor with its approval endorsed on the document or shall notify the Contractor in writing of its disapproval of the document and the reasons for disapproval and the modifications that the Project Manager proposes. If the Project Manager fails to take such action within the fourteen (14) days, then the document shall be deemed to have been approved by the Project Manager.

21.5.2 The Project Manager shall not disapprove any document, except on the grounds that the document does not comply with the Contract or that it is contrary to good engineering practice.

21.5.3 If the Project Manager disapproves the document, the Contractor shall modify the document and resubmit it for the Project Manager’s approval in accordance with GC Sub-Clause 21.4. If the Project Manager approves the document subject to modification(s), the Contractor shall make the required modification(s), and the document shall be deemed to have been approved.

21.5.4 If any dispute or difference occurs between the Employer and the Contractor in connection with or arising out of the disapproval by the Project Manager of any document and/or any modification(s) to a document that cannot be settled between the Parties within a reasonable period, then, in case the Contract includes and names an Adjudicator, such dispute may be referred to the Adjudicator for determination in accordance with GC Clause 52 (Disputes and Arbitration). If such dispute is referred to an Adjudicator, the Project Manager shall give instructions as to whether and if so, how, performance of the Contract is to proceed. The Contractor shall proceed with the Contract in accordance with the Project Manager's instructions, provided that if the Adjudicator upholds the Contractor's view on the dispute and if the Employer has not given notice under GC Clause 52, then the Contractor shall be reimbursed by the Employer for any additional costs incurred by reason of such instructions and shall be relieved of such responsibility or liability in connection with the dispute and the execution of the instructions as the Adjudicator shall decide, and the Time for Operational Acceptance shall be extended accordingly.

21.5.5 The Project Manager's approval, with or without modification of the document furnished by the Contractor, shall not relieve the Contractor of any responsibility or liability imposed upon it by any provisions of the Contract except to the extent that any subsequent failure results from modifications required by the Project Manager or inaccurate information furnished in writing to the Contractor by or on behalf of the Employer.

21.5.6 The Contractor shall not depart from any approved document unless the Contractor has first submitted to the Project Manager an amended document and obtained the Project Manager's approval of the document, pursuant to the provisions of this GC Sub-Clause 21.5. If the Project Manager requests any change in any already approved document and/or in any document based on such an approved document, the provisions of GC Clause 43 (Change in the Facility) shall apply to such request.

22. Transport and Delivery

22.1 Subject to GC Clauses 9 and 14, the Contractor shall manufacture or procure and transport all IT Products and/or Services in an expeditious and orderly manner to the Project Site.

22.2 Delivery of the IT Products and/or Services shall be made by the Contractor in accordance with the SOR.

22.3 Early or partial deliveries require the explicit written consent of the Employer, which consent shall not be unreasonably withheld.

22.4 Transportation

22.4.1 The Contractor shall provide such packing of the IT Products and/or Services as is required to prevent their damage or deterioration during shipment. The packing, marking, and documentation within and outside the packages shall comply strictly with the Employer's instructions to the Contractor.

22.4.2 The Contractor shall bear responsibility for and cost of transport to the Project Sites in accordance with the terms and conditions used in the specification of prices in Appendix 6 (Revised Price Schedules) to the Contract, including the terms and conditions of the associated Incoterms.

22.4.3 Unless otherwise specified in the PC, the Contractor shall be free to use transportation through carriers registered in any Eligible Country and to obtain insurance from any Eligible Country.

22.5 Unless otherwise specified in the PC, the Contractor shall provide the Employer with shipping and other documents, as specified below:

For Products supplied from outside the Employer's Country:

(a) Upon shipment, the Contractor shall notify the Employer and the insurance company contracted by the Contractor to provide cargo insurance by cable, facsimile, electronic mail, or Electronic Data Interchange (EDI) with the full details of the shipment. The Contractor shall promptly send the following documents to the Employer by mail or courier, as appropriate, with a copy to the cargo insurance company:

(i) two copies of the Contractor's invoice showing the description of the Products, quantity, unit price, and total amount;

(ii) usual transportation documents;

(iii) insurance certificate;

(iv) certificate(s) of origin; and

(v) estimated time and point of arrival in the Employer's Country and at the Project Sites.

For Products supplied locally (i.e. from within the Employer's Country):

(b) Upon shipment, the Contractor shall notify the Employer by cable, facsimile, electronic mail, or EDI with the full details of the shipment. The Contractor shall promptly send the following documents to the Employer by mail or courier, as appropriate:

(i) two copies of the Contractor's invoice showing the

Products’ description, quantity, unit price, and total amount;

(ii) delivery note, railway receipt, or truck receipt;

(ii) certificate of insurance;

(iii) certificate(s) of origin; and

(iv) estimated time of arrival at the Project Sites.

22.6 Customs clearance

22.6.1 The Employer shall bear responsibility for, and cost of, customs clearance into the Employer’s Country in accordance with the particular Incoterm(s) used for Products supplied from outside the Employer’s Country in the Price Schedules referred to by Article 2 of the Contract.

22.6.2 At the request of the Employer, the Contractor shall make available a representative or agent during the process of customs clearance in the Employer’s Country for Products supplied from outside the Employer’s Country. In the event of delays in customs clearance that are not the fault of the Contractor:

(a) the Contractor shall be entitled to an extension in the Time for Achieving Operational Acceptance, pursuant to GC Clause 44 (Extension of Time for Completion);

(b) the Contract Price shall be adjusted to compensate the Contractor for any additional storage charges that the Contractor may incur as a result of the delay.

23. Product Upgrades

23.1 At any point during performance of the Contract, should technological advances be introduced by the Contractor for the IT Products and/or Services originally offered by the Contractor in its bid and still to be delivered, the Contractor shall be obligated to offer to the Employer the latest versions of the available information technologies having equal or better performance or functionality at the same or lesser unit prices, pursuant to GC Clause 43 (Change in the Facility).

23.2 At any point during performance of the Contract, for IT Products and/or Services still to be delivered, the Contractor will also pass on to the Employer any cost reductions and additional and/or improved support and facilities that it offers to other clients of the Contractor in the Employer’s Country, pursuant to GC Clause 43.

23.3 During performance of the Contract, the Contractor shall offer to the Employer all new versions, releases, and updates of Standard Software, as well as related documentation and technical support services, within thirty (30) days of their availability from the Contractor to other clients of the Contractor in the Employer’s

Country, and no later than twelve (12) months after they are released in the country of origin. In no case will the prices for this Software exceed those quoted by the Contractor in the Recurrent Costs tables in its bid.

23.4 During the Warranty Period, unless otherwise specified in the PC, the Contractor will provide at no additional cost to the Employer all new versions, releases, and updates for all Standard Software that are used in with the IT Products and/or Services, within thirty (30) days of their availability from the Contractor to other clients of the Contractor in the Employer's country, and no later than twelve (12) months after they are released in the Country of Origin of the Software.

23.5 The Employer shall introduce all new versions, releases or updates of the Software within eighteen (18) months of receipt of a production-ready copy of the new version, release, or update, provided that the new version, release, or update does not adversely affect System operation or performance or require extensive reworking of the System. In cases where the new version, release, or update adversely affects System operation or performance, or requires extensive reworking of the System, the Contractor shall continue to support and maintain the version or release previously in operation for as long as necessary to allow introduction of the new version, release, or update. In no case shall the Contractor stop supporting or maintaining a version or release of the Software less than twenty-four (24) months after the Employer receives a production-ready copy of a subsequent version, release, or update. The Employer shall use all reasonable endeavors to implement any new version, release, or update as soon as practicable, subject to the twenty four-month-long stop date.

24. IT Products and/or Services

24.1 Prices charged by the Contractor for IT Products and/or Services, that are not included in the Contract, shall be agreed upon in advance by the parties (including, but not restricted to, any prices submitted by the Contractor in the Recurrent Cost Schedules of its Bid) and shall not exceed the prevailing rates charged by the Contractor to other Employers in the Employer's Country for similar IT Products and/or Services.

25. Inspection and Testing

25.1 The Employer or its representative shall have the right to inspect and/or test any components of the IT Products and/or Services, as specified in the SOR, or specify such tests to be executed by the Contractor, to confirm their good working order and/or conformity to the Contract at the point of delivery and/or at the Project Site.

25.2 The Employer and the Project Manager or their designated representatives shall be entitled to attend the aforesaid test and/or inspection, provided that the Employer shall bear all costs and expenses incurred in connection with such attendance including, but not limited to, all traveling and board and lodging expenses.

25.3 Whenever the Contractor is ready to carry out any such test and/or inspection, the Contractor shall give a reasonable advance notice of such test and/or inspection and of the place and time thereof to the

Project Manager. The Contractor shall obtain from any relevant third Party or manufacturer any necessary permission or consent to enable the Employer and the Project Manager or their designated representatives to attend the test and/or inspection.

25.4 The Contractor shall provide the Project Manager with a certified report of the results of any such test and/or inspection.

25.5 If the Employer or Project Manager or their designated representatives fails to attend the test and/or inspection, or if it is agreed between the Parties that such persons shall not do so, then the Contractor may proceed with the test and/or inspection in the absence of such persons, and may provide the Project Manager with a certified report of the results thereof.

25.6 The Project Manager may require the Contractor to carry out any test and/or inspection not required by the Contract, provided that the Contractor's reasonable costs and expenses incurred in the carrying out of such test and/or inspection shall be added to the Contract Price. Further, if such test and/or inspection impede the progress of work on the Facilities and/or the Contractor's performance of its other obligations under the Contract, due allowance will be made in respect of the Time for Completion and the other obligations so affected.

25.7 If any component of the IT Products and/or Services fails to pass any test and/or inspection, the Contractor shall either rectify or replace such component and shall repeat the test and/or inspection upon giving a notice under GC Sub-Clause 25.3.

25.8 If any dispute shall arise between the parties in connection with or caused by an inspection and/or with regard to any component to be incorporated in the IT Products and/or Services that cannot be settled amicably between the parties within a reasonable period of time, either party may invoke the process pursuant to GC Clause 52 (Disputes and Arbitration), starting with referral of the matter to the Adjudicator in case an Adjudicator is included and named in the Contract.

26. Completion

26.1 As soon as the IT Products and Installation Services have, in the opinion of the Contractor, been delivered, Pre-commissioned, and made ready for Commissioning and Operational Acceptance Testing in accordance with the Schedule of Requirements, and the Agreed and Finalized Project Plan, the Contractor shall so notify the Employer in writing.

26.2 The Project Manager shall, within fourteen (14) days after receipt of the Contractor's notice under GC Sub-Clause 26.1, either issue an Installation Certificate in the form specified in the Sample Forms Section in the Bidding Documents, stating that the Installation of the IT Products has been achieved by the date of the Contractor's notice under GC Clause 26.1, or notify the Contractor in writing of any defects and/or deficiencies, including, but not limited to, defects or deficiencies in the interoperability or integration of the various components making up the IT Products and Installation Services. The Contractor shall use all reasonable endeavors to promptly remedy any defect and/or deficiencies that have been notified to the Contractor by the Project Manager. The Contractor shall then promptly carry out retesting of the IT Products and Installation Services and, when in the Contractor's opinion they are ready for Commissioning and Operational Acceptance Testing, notify the Employer in writing, in accordance with GC Sub-Clause 26.1. The procedure set out in this Sub-Clause GC 26.2 shall be repeated, as necessary, until the Installation Certificate is issued.

26.3 If the Project Manager fails to issue the Installation Certificate and fails to inform the Contractor of any defects and/or deficiencies within fourteen (14) days after receipt of the Contractor's notice under GC Sub-Clause 26.1, or if the Employer puts the IT Products and Installation Services into production operation, then the IT Products and Installation Services shall be deemed to have achieved successful Installation as of the date of the Contractor's notice or repeated notice, or when the Employer put the IT Products and Installation Services into production operation, as the case may be.

27. Commissioning and Operational Acceptance

27.1 Commissioning

27.1.1 Commissioning of the IT Products and/or Services shall be commenced by the Contractor:

(a) immediately after issue of the Installation Certificate is issued by the Project Manager, pursuant to GC Sub-Clause 26.2, or

(b) as otherwise specified in the Technical Requirements (specified in the SOR) or the Agreed and Finalized Project Plan; or

(c) immediately after Installation occurred, under GC Sub-Clause 26.3.

27.1.2 The Employer shall supply the operating and technical personnel and all materials and information reasonably required to enable the Contractor to carry out its obligations with respect to Commissioning. Production use of the IT Products and/or Services shall not commence prior to the start of the formal Operational Acceptance Testing.

27.2 Operational Acceptance Test

27.2.1 The Operational Acceptance Tests (and repeats of each tests) shall be the primary responsibility of the Employer (in accordance with GC Sub-Clause 10.10), but shall be conducted with the full cooperation of the Contractor during Commissioning of the IT Products and Installation Services to ascertain whether they conform to the SOR and meets the standard of performance quoted in the Contractor's bid, including, but not restricted to, the functional and technical performance requirements. The Operational Acceptance Tests during Commissioning will be conducted as specified in the SOR and/or the Agreed and Finalized Project Plan.

27.2.2 At the Employer's discretion, Operational Acceptance Tests may also be performed on replacement Products, upgrades and new version releases, and Products that are added or field-modified after Operational Acceptance of the System.

27.2.3 If for reason attributable to the Employer, the Operational Acceptance Test of the IT Products and Installation Services cannot be successfully completed within the period specified in the SOR, from the date of Installation or any other period agreed upon in writing by the Employer and the Contractor, the Contractor shall be deemed to have fulfilled its obligations with respect to the technical and functional aspects of the SOR and/or the Agreed and Finalized Project Plan, and GC Sub-Clauses 28.2 and 28.3 (Completion Time Guarantee) shall not apply.

27.3 Operational Acceptance

27.3.1 Subject to GC Sub-Clause 27.4 (Partial Acceptance) below, Operational Acceptance shall occur in respect of the IT Products and Installation Services when

(a) the Operational Acceptance Tests, specified in the SOR and/or Agreed and Finalized Project Plan have been successfully completed; or

(b) the Operational Acceptance Tests have not been successfully completed or have not been carried out for reasons that are attributable to the Employer within the period from the date of Installation or any other agreed-upon period as specified in GC Clause 27.2.3 above; or

(c) the Employer has put the System into production or use for sixty (60) consecutive days. If the System is put into production or use in this manner, the Contractor shall notify the Employer and document such use.

27.3.2 At any time after any of the events set out in GC Sub-Clause 27.3.1 above have occurred, the Contractor may give a notice to the Project Manager requesting the issue of an Operational Acceptance Certificate.

27.3.3 After consultation with the Employer, and within fourteen (14) days after receipt of the Contractor's notice, the Project Manager shall:

(a) issue an Operational Acceptance Certificate; or

(b) notify the Contractor in writing of any defect or deficiencies or other reason for the failure of the Operational Acceptance Tests; or

(c) issue the Operational Acceptance Certificate, if the situation covered by GC Clause 27.3.1 (b) arises.

27.3.4 The Contractor shall use all reasonable endeavors to promptly remedy any defect and/or deficiencies and/or other reasons for the failure of the Operational Acceptance

Test that the Project Manager has notified to the Contractor. Once such remedies have been made by the Contractor, the Contractor shall notify the Employer, and the Employer, with the full cooperation of the Contractor, shall use all reasonable endeavors to promptly carry out retesting of the IT Products and Installation Services. Upon the successful conclusion of the Operational Acceptance Tests, the Contractor shall notify the Employer of its request for Operational Acceptance Certification, in accordance with GC Sub-Clause 27.3.2. The Employer shall then issue to the Contractor the Operational Acceptance Certification in accordance with GC Sub-Clause 27.3.3 (a), or shall notify the Contractor of further defects, deficiencies, or other reasons for the failure of the Operational Acceptance Test. The procedure set out in this GC Sub-Clause 27.3.4 shall be repeated, as necessary, until the Operational Acceptance Certificate is issued.

27.3.5 If the System or Subsystem fails to pass the Operational Acceptance Test(s) in accordance with GC Sub-Clause 27.2, then either:

(a) the Employer may consider terminating the Contract, pursuant to GC Clause 47 (Termination for Contractor's Default), or

(b) (ii) if the failure to achieve Operational Acceptance within the specified time period is a result of the failure of the Employer to fulfill its obligations under the Contract, then the Contractor shall be deemed to have fulfilled its obligations with respect to the relevant technical and functional aspects of the Contract, and GC Sub-Clauses 30.3 and 30.4 (Functional Guarantees) shall not apply.

27.3.6 If within fourteen (14) days after receipt of the Contractor's notice, the Project Manager fails to issue the Operational Acceptance Certificate or fails to inform the Contractor in writing of the justifiable reasons why the Project Manager has not issued the Operational Acceptance Certificate, the IT Products and Installation Services shall be deemed to have been accepted as of the date of the Contractor's said notice.

27.4 Partial Acceptance

27.4.1 If so specified in the SOR for GC Sub-Clause 27.2(a), Installation and Commissioning shall be carried out individually for each identified major component of the IT Products and Installation Services. In this event, the provisions in the Contract relating to Installation and Commissioning, including the Operational Acceptance Test, shall apply to each such major component individually, and Operational Acceptance Certificate(s) shall be issued accordingly for each such major component, subject to the limitations contained in GC Sub-Clause 27.4.2.

27.4.2 The issuance of Operational Acceptance Certificates for individual major components pursuant to GC Sub-Clause 27.4.1 shall not relieve the Contractor of its obligation to obtain an Operational Acceptance Certificate for the IT Products and Installation Services as a whole once all major components have been supplied, installed, tested, and commissioned.

27.4.3 In the case of minor components for the IT Products and Installation Services that by their nature do not require Commissioning or an Operational Acceptance Test, the Project Manager shall issue an Operational Acceptance Certificate within fourteen (14) days after such components have been delivered and/or installed or the site works have been completed. The Contractor shall, however, use all reasonable endeavors to promptly remedy any defects or deficiencies in such minor components detected by the Employer or Contractor.

F. Guarantees and Liabilities

28. Completion Time Guarantee

28.1 The Contractor guarantees that it shall complete the supply, Installation, Commissioning, and achieve Operational Acceptance of the IT Products and/or Services within the time periods specified in the Implementation Schedule and/or Agreed and Finalized Project Plan pursuant to GC Sub-Clause 8.2, or within such extended time to which the Contractor shall be entitled under GC Clause 44 (Extension of Time for Completion).

28.2 If the Contractor fails to supply, install, commission, and achieve Operational Acceptance of the IT Products and/or Services within the time for achieving Operational Acceptance specified in the Implementation Schedule or the Agreed and Finalized Project Plan, or any extension of the time for achieving Operational Acceptance previously granted under GC Clause 44 (Extension of Time for Completion), the Contractor shall pay to the Employer liquidated damages at the rate specified in the PC as a percentage of the Contract Price, or the relevant part of the Contract Price if a major component of the IT Products and/or Services has not achieved Operational Acceptance. The aggregate amount of such liquidated damages shall in no event exceed the amount specified in the PC ("the Maximum"). Once the Maximum is reached, the Employer may consider termination of the Contract, pursuant to GC Sub-Clause 47 (Termination for Contractor's Default).

28.3 Unless otherwise specified in the PC, liquidated damages payable under GC Sub-Clause 28.2 shall apply only to the failure to achieve Operational Acceptance of the IT Products and/or Services as specified in the Implementation Schedule and/or Agreed and Finalized Project Plan. This GC Sub-Clause 28.3 shall not limit, however, any other rights or remedies the Employer may have under the Contract for other delays.

28.4 If liquidated damages are claimed by the Employer for the IT Products and/or Services, the Contractor shall have no further liability whatsoever to the Employer in respect to the Operational Acceptance time guarantee for the System (or Subsystem).

However, the payment of liquidated damages shall not in any way relieve the Contractor from any of its obligations to complete the IT Products and/or Services or from any other of its obligations and liabilities under the Contract.

29. Defect Liability

29.1 The Contractor warrants that for the period specified in the SOR, all Products, including Documentation, and/or Services (to the extent relevant) to be delivered under this contract:

(a) shall be free from defects in the design, engineering, and workmanship;

(b) are newly manufactured, unused, and incorporate all recent material improvements in design; and

(c) complies with or exceeds the Technical Specifications in the SOR.

Exceptions and/or limitations, if any, to this warranty with respect to Software (or categories of Software), shall be as specified in the PC. Commercial warranty provisions of products supplied under the Contract shall apply to the extent that they do not conflict with the provisions of this Contract.

29.2 In addition, the Contractor warrants that:

(a) all Products components to be incorporated into the System form part of the Contractor's and/or Sub-Contractor's current product lines,

(b) they have been previously released to the market, and

(c) those specific items identified in the PC (if any) have been in the market for at least the minimum periods specified in the PC.

29.3 The Warranty Period shall commence from the date of Operational Acceptance of the IT Products and/or Services and shall extend for the length of time specified in the PC.

29.4 If during the Warranty Period any defect as described in GC Sub-Clause 29.1 should be found in the design, engineering, Documentation, and workmanship of the Products and/or Services provided by the Contractor, the Contractor shall promptly, in consultation and agreement with the Employer regarding appropriate remedying of the defects, and at its sole cost, repair, replace, or otherwise make good (as the Contractor shall, at its discretion, determine) such defect as well as any damage to the Products and/or Services caused by such defect. Any defective Products and/or Services that have been replaced by the Contractor shall remain the property of the Contractor.

29.5 The Contractor shall not be responsible for the repair, replacement, or making good of any defect or of any damage to the Products and/or Services arising out of or resulting from any of the following causes:

(a) improper operation or maintenance of the Product and/or

Service by the Employer;

(b) normal wear and tear;

(c) use of the IT Products and/or Services with items not supplied by the Contractor, unless otherwise identified in the Schedule of Requirements, or approved by the Contractor; or

(d) modifications made to the Products and/or Services by the Employer, or a third party, not approved by the Contractor.

29.6 The Contractor's obligations under this GC Clause 29 shall not apply to:

(a) any materials that are normally consumed in operation or have a normal life shorter than the Warranty Period; or

(b) any designs, specifications, or other data designed, supplied, or specified by or on behalf of the Employer or any matters for which the Contractor has disclaimed responsibility in writing and has been accepted by the Employer.

29.7 The Employer shall give the Contractor a notice promptly following the discovery of such defect, stating the nature of any such defect together with all available evidence.

29.8 The Contractor may, with the consent of the Employer, remove from the Site any IT Products and/or Services that are defective, if the nature of the defect, and/or any damage to the IT Products and/or Services caused by the defect, is such that repairs cannot be expeditiously carried out at the Site. If the repair, replacement, or making good is of such a character that it may affect the efficiency of the IT Products and/or Services, the Employer may give the Contractor notice requiring that tests of the defective part be made by the Contractor immediately upon completion of such remedial work, whereupon the Contractor shall carry out such tests.

29.9 If such part fails the tests, the Contractor shall carry out further repair, replacement, or making good (as the case may be) until that part of the IT Product and/or Service passes such tests. The tests shall be agreed upon by the Employer and the Contractor.

29.10 If the Contractor fails to commence the work necessary to remedy such defect or any damage to the IT Product and/or Service caused by such defect within the time period specified in the PC, the Employer may, following notice to the Contractor, proceed to do such work or contract a third party (or parties) to do such work, and the reasonable costs incurred by the Employer in connection with such work shall be paid to the Employer by the Contractor or may be deducted by the Employer from any monies due the Contractor or claimed under the performance security (refer GC Sub-Clause 13.3 (Performance Security).

29.11 If the IT Products and/or Services cannot be used by reason of such defect and/or making good of such defect, the Warranty Period for the IT Products and/or Services shall be extended by a period equal to the period during which the IT Products and/or Service could not be used by the Employer because of such defect and/or making good of such defect.

29.12 Items substituted for defective parts of the IT Product and/or Service during the Warranty Period shall be covered by the Defect Liability Period for the remainder of the Warranty Period applicable for the part replaced or three (3) months, whichever is greater.

29.13 At the request of the Employer and without prejudice to any other rights and remedies that the Employer may have against the Contractor under the Contract, the Contractor will offer all possible assistance to the Employer to seek warranty services or remedial action from any subcontracted third-party producers or licensor of IT Products and/or Services including without limitation assignment or transfer in favour of the Employer of the benefit of any warranties given by such producers or licensors to the Contractor.

30. Functional Guarantees

30.1 The Contractor guarantees that during the Operational Acceptance, the IT Products and/or Services and all parts thereof shall attain the Functional Guarantees, subject to and upon the conditions therein specified.

30.2 If, for reasons attributable to the Contractor, the minimum level of the Functional Guarantees are not met either in whole or in part, the Contractor shall at its cost and expense make such changes, modifications and/or additions to the IT Products and/or Services or any part thereof as may be necessary to meet at least the minimum level of such Guarantees. The Contractor shall notify the Employer upon completion of the necessary changes, modifications and/or additions, and shall request the Employer to repeat the Operational Acceptance Test until the minimum level of the Guarantees has been met. If the Contractor eventually fails to meet the minimum level of Functional Guarantees, the Employer may consider termination of the Contract, pursuant to GC Clause 47 (Termination for Contractor’s Default).

30.3 If, for reasons attributable to the Contractor, the Functional Guarantees are not attained either in whole or in part, but the minimum level of the Functional Guarantees is met, the Contractor shall, at the Contractor’s option, either

(a) make such changes, modifications and/or additions to the Facilities or any part thereof that are necessary to attain the Functional Guarantees at its cost and expense, and shall request the Employer to repeat the Operational Acceptance Test; or

(b) pay liquidated damages to the Employer in respect of the failure to meet the Functional Guarantees.

30.4 The payment of liquidated damages under GC Sub-Clause 30.3, up to the limitation of liability specified in the Appendix to the Contract titled Functional Guarantees, shall completely satisfy the Contractor’s guarantees under GC Sub-Clause 30.3, and the Contractor shall have no further liability whatsoever to the Employer in respect thereof. Upon the payment of such liquidated damages by the Contractor, the Project Manager shall issue the Operational Acceptance Certificate for the Facilities or any part thereof in respect of which the liquidated damages have been so paid.

31. Intellectual Property Rights Warranty

31.1 The Contractor hereby represents and warrants that:

(a) the IT Products and/or Services as supplied, installed, tested and accepted;

(b) use of the IT Products and/or Services in accordance with the Contract; and

(c) copying of the Software and Documentation provided to the Employer in accordance with the Contract

do not and will not infringe any Intellectual Property Rights held by any third party and that it has all necessary rights or at its sole expense shall have secured in writing all transfers of rights and other consents necessary to make the assignments, licenses, and other transfers of Intellectual Property Rights and the warranties set forth in the Contract, and for the Employer to own or exercise all Intellectual Property Rights as provided in the Contract. Without limitation, the Contractor shall secure all necessary written agreements, consents, and transfers of rights from its employees and other persons or entities whose services are used for development of the IT Products and/or Services.

32. Intellectual Property Rights Indemnity

32.1 The Contractor shall indemnify and hold harmless the Employer and its employees and officers from and against any and all losses, liabilities, and costs (including losses, liabilities, and costs incurred in defending a claim alleging such a liability), that the Employer or its employees or officers may suffer as a result of any infringement or alleged infringement of any Intellectual Property Rights.

32.2 Such indemnity shall not cover any use of the IT Products and/or Services, including the Documentation, other than for the purpose indicated by or to be reasonably inferred from the Contract, any infringement resulting from the use of the IT Products and/or Services, or any secondary IT Products and/or Services that result thereby in association or combination with any IT Products and/or Services not supplied by the Contractor, where the infringement arises because of such association or combination and not because of use of the IT Products and/or Services in its own right.

32.3 Such indemnities shall also not apply if any claim or infringement:

(a) is asserted by a parent, subsidiary, or affiliate of the Employer's organization;

(b) is a direct result of a design mandated by the Employer's SOR and the possibility of such infringement was duly noted in the Contractor's bid; or

(c) results from the alteration of the IT Products and/or Services, including the Documentation, by the Employer or any persons other than the Contractor or a person authorized by the Contractor.

32.4 If a claim of infringement of Intellectual Property Rights is made or threatened by a third party, the Employer will allow the Contractor, at the Contractor's expense, to either:

(a) obtain for the Employer the right to continued use of the IT Products and/or Services; or

(b) replace or modify the IT Products and/or Services so that the alleged infringement ceases so long as the IT Products and/or Services continue to provide the Customer with equivalent functionality and performance as required in the SOR.

32.5 The Employer shall indemnify and hold harmless the Contractor and its employees, officers and Sub-Contractors from and against any and all losses, liabilities, and costs incurred in defending a claim alleging such a liability) that the Contractor or its employees, officers, or Sub-Contractors may suffer as a result of any infringement or alleged infringement of any Intellectual Property Rights arising out of or in connection with any design, data drawing, specification, or other documents or materials provided to the Contractor in connection with this Contract by the Employer or any persons (other than the Contractor) contracted by the Employer, except to the extent that such losses, liabilities, and costs arise as a result of the Contractor's breach of GC Sub-Clause 32.8.

32.6 Such indemnity shall not cover any use of the design, data, drawing, specification, or other documents or materials, other than for the purpose indicated by or to be reasonably inferred from the Contract, or any infringement resulting from the use of the design, data, drawing, specification, or other documents or materials, or any products produced thereby, in association or combination with any other IT Products and/or Services not provided by the Employer or any other person contracted by the Employer, where the infringement arises because of such association or combination and not because of the use of the design, data, drawing, specification, or other documents or materials in its own right.

32.7 Such indemnities shall also not apply:

(a) if any claim of infringement is asserted by a parent, subsidiary, or affiliate of the Contractor's organization;

(b) to the extent that any claim of infringement caused by the alteration, by the Contractor, or any persons contracted by the Contractor, of the design, data, drawing, specification, or other documents or materials provided to the Contractor by the Employer or any persons contracted by the Employer.

32.8 If any proceedings are brought or any claim is made against the Contractor arising out of the matters referred to in GC Sub-Clause 32.5, the Contractor shall promptly give the Employer notice of such proceedings or claims, and the Employer may at its own expense and in the Contractor’s name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim. If the Employer fails to notify the Contractor within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Contractor shall be free to conduct the same on its own behalf. Unless the Employer has so failed to notify the Contractor within the twenty-eight (28) days, the Contractor shall made no admission that may be prejudicial to the defense of any such proceedings or claim. The Contractor shall, at the Employer’s request, afford all available assistance to the Employer in conducting such proceedings or claim and shall re reimbursed by the Employer for all reasonable expenses incurred in so doing.

33. Limitation of Liability

33.1 Except in cases of criminal negligence or willful misconduct, and Intellectual Property Rights Indemnity claims pursuant to Clause 32:

(a) neither Party shall be liable to the other Party, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, which may be suffered by the other Party in connection with the Contract, other than specifically provided as any obligation of the Party in the Contract, and

(b) the aggregate liability of the Contractor to the Employer, whether under the Contract, in tort or otherwise, shall not exceed the amount resulting from the application of the multiplier specified in the PC, to the Contract Price or, if a multiplier is not so specified, the total Contract Price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment, or to any obligation of the Contractor to indemnify the Employer with respect to patent infringement.

34. Criminal Charges and Convictions

34.1 The Contractor warrants that it has disclosed and will continue to disclose during the term of this Contract full details of all criminal convictions and all pending criminal charges against it or any of its personnel, associates or Sub-Contractors that would reasonably be expected to adversely affect the Contractor or the Contractor’s capacity to fulfill its obligations under this Contract. The Contractor is not required to provide information to the Contractor in a form or in a manner which would cause the Contractor to breach the privacy of the individual but the Contractor will take all reasonable steps to either:

(a) provide sufficient information to enable the Employer to assess the level of any risk or conflict posed to it by the existence of such conviction or pending charge; or

(b) take such steps as necessary to ensure that the person who is the subject of the conviction or pending charge ceases to be directly or indirectly involved with this Contract.

34.2 A failure to make any such disclosure will be treated as a material breach of this Contract.

G. Risk Distribution

35. Transfer of Ownership

35.1 With the exception of any Software and Documentation, the ownership of the IT Products and/or Services shall be transferred to the Employer at the time of Delivery or otherwise under terms that may be agreed upon and specified in the Contract.

35.2 Ownership and the terms of usage of any Software and Documentation supplied under the Contract shall be governed by GC Clause 15 (Intellectual Property and Copyright), and any elaboration in the SOR.

35.3 Ownership of the Contractor's Equipment used by the Contractor and its Sub-Contractors in connection with the Contract shall remain with the Contractor or its Sub-Contractors.

36. Care of IT Products and/or Services

36.1 The Contractor shall be responsible for the care and custody of the IT Products and/or Services or any part thereof until the date of Completion of the IT Products and/or Services pursuant to GC Clause 26 (Completion) or, where the Contract provides for Completion of the IT Products and/or Services in parts, until the date of Completion of the relevant part, and shall make good at its own cost any loss or damage that may occur to the IT Products and/or Services or the relevant part thereof from any cause whatsoever during such period. The Contractor shall also be responsible for any loss or damage to the IT Products and/or Services caused by the Contractor or its Sub-Contractors in the course of any work carried out, pursuant to GC Clause 29 (Defect Liability). Notwithstanding the foregoing, the Contractor shall not be liable for any loss or damage to the IT Products and/or Services or that part thereof caused by reason of any of the matters specified or referred to in paragraphs (a), (b) and (c) of GC Sub-Clauses 36.2 and 42.1 (War Risks).

36.2 If any loss or damage occurs to the IT Products and/or Services or any part thereof or to the Contractor's temporary IT Products and/or Services by reason of

(a) insofar as they relate to the country where the Site is located, nuclear reaction, nuclear radiation, radioactive contamination, pressure wave caused by aircraft or other aerial objects, or any other occurrences that an experienced contractor could not reasonably foresee, or if reasonably foreseeable could not reasonably make provision for or insure against, insofar as such risks are not normally insurable on the insurance market and are mentioned in the general exclusions of the policy of insurance, including War Risks and Political Risks, taken out under GC Clause 38 (Insurance) hereof; or

(b) any use or occupation by the Employer or any third Party other than a Sub-Contractor, authorized by the Employer of any part of the IT Products and/or Services; or

(c) any use of or reliance upon any design, data or specification provided or designated by or on behalf of the Employer, or any such matter for which the Contractor has disclaimed responsibility herein,

the Employer shall pay to the Contractor all sums payable in respect of the IT Products and/or Services executed, notwithstanding that the same be lost, destroyed or damaged, and will pay to the Contractor the replacement value of all temporary facilities and all parts thereof lost, destroyed or damaged. If the Employer requests the Contractor in writing to make good any loss or damage to the IT Products and/or Services thereby occasioned, the Contractor shall make good the same at the cost of the Employer in accordance with GC Clause 43 (Change in the Facilities). If the Employer does not request the Contractor in writing to make good any loss or damage to the IT Products and/or Services thereby occasioned, the Employer shall either request a change in accordance with GC Clause 43, excluding the performance of that part of the IT Products and/or Services thereby lost, destroyed or damaged, or, where the loss or damage affects a substantial part of the IT Products and/or Services, the Employer shall terminate the Contract pursuant to GC Sub-Clause 46.1 hereof.

36.3 The Contractor shall be liable for any loss of or damage to any Contractor's Equipment, or any other property of the Contractor used or intended to be used for purposes of the IT Products and/or Services, except

(a) as mentioned in GC Sub-Clause 36.2 with respect to the Contractor's temporary IT Products and/or Services, and

(b) where such loss or damage arises by reason of any of the matters specified in GC Sub-Clauses 36.2 (b) and (c) and 42.1 (War Risks).

36.4 With respect to any loss or damage caused to the IT Products and/or Services or any part thereof or to the Contractor's Equipment by reason of any of the matters specified in GC Sub-Clause 42.1, the provisions of GC Sub-Clause 42.3 shall apply.

37. Loss of or Damage to Property; Accident or Injury to Workers; Indemnification

37.1 The Contractor and each and every Sub-Contractor shall abide by the job safety, insurance, customs, and immigration measures prevalent and laws in force in the Employer's Country.

37.2 Subject to GC Sub-Clause 37.3, the Contractor shall indemnify and hold harmless the Employer and its employees and officers from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, in respect of the death or injury of any person or loss of or damage to any property other than the IT Products and/or Services whether accepted or not, arising in connection with the supply and installation of the IT Products and/or Services and by reason of the negligence of the Contractor or its Sub-Contractors, or their employees, officers or agents, except any injury, death or property damage caused by the negligence of the Employer, its contractors, employees, officers or agents.

37.3 If any proceedings are brought or any claim is made against the Employer that might subject the Contractor to liability under GC Sub-

Clause 37.2, the Employer shall promptly give the Contractor a notice thereof and the Contractor may at its own expense and in the Employer's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim. If the Contractor fails to notify the Employer within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Employer shall be free to conduct the same on its own behalf. Unless the Contractor has so failed to notify the Employer within the twenty-eight (28) day period, the Employer shall make no admission that may be prejudicial to the defense of any such proceedings or claim. The Employer shall, at the Contractor's request, afford all available assistance to the Contractor in conducting such proceedings or claim and shall be reimbursed by the Contractor for all reasonable expenses incurred in so doing.

37.4 The Employer shall indemnify and hold harmless the Contractor and its employees, officers and Sub-Contractors from any and all losses, liabilities, and costs (including losses, liabilities, and costs incurred in defending a claim alleging such a liability) that the Contractor or its employees, officers, or Sub-Contractors may suffer as a result of the death or personal injury of any person or loss of or damage to property of the Employer, other than the IT Products and/or Services not yet achieving Operational Acceptance, that is caused by fire, explosion, or any other perils, in excess of the amount recoverable from insurances procured under GC Clause 38 (Insurance), provided that such fire, explosion, or other perils were not caused by any act or failure of the Contractor.

37.5 If any proceedings are brought or any claim is made against the Contractor that might subject the Employer to liability under GC Sub-Clause 37.4, the Contractor shall promptly give the Employer notice of such proceedings or claims, and the Employer may at its own expense and in the Contractor's name conduct such proceedings or claim and any negotiations for the settlement of any such proceeding or claim. If the Employer fails to notify the Contractor within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Contractor shall be free to conduct the same on its own behalf. Unless the Employer has so failed to notify the Contractor within twenty-eight (28) days, the Contractor shall make no admission that may be prejudicial to the defense of any such proceedings or claim. The Contractor shall, at the Employer's request, afford all available assistance to the Employer in conducting such proceedings or claim and shall be reimbursed by the Employer for all reasonable expense incurred in so doing.

37.6 The Party entitled to the benefit of an indemnity under this GC Clause 37 shall take all reasonable measures to mitigate any loss or damage which has occurred. If the Party fails to take such measures, the other Party's liabilities shall be correspondingly reduced.

38. Insurance

38.1 To the extent specified in the Appendix to the Contract titled Insurance Requirements, the Contractor shall at its expense take out and maintain in effect, or cause to be taken out and maintained in effect, during the performance of the Contract, the insurances set forth below in the sums and with the deductibles and other conditions specified in the said Appendix. The identity of the insurers and the form of the policies shall be subject to the approval of the Employer, who should not unreasonably withhold such approval.

38.1.1 Cargo Insurance During Transport
As applicable, 110 percent of the price of the Products covering the Products at the Site from all risks of physical loss or damage (excluding only perils commonly excluded under "all risks" insurance policies of this type of reputable insurers) occurring prior to Operational Acceptance of the IT Products and/or Services.

38.1.2 Installation All Risks Insurance
Covering physical loss or damage to the IT Products and/or Services at the Site, occurring prior to Completion of the Facilities, with an extended maintenance coverage for the Contractor's liability in respect of any loss or damage occurring during the Defect Liability Period while the Contractor is on the Site for the purpose of performing its obligations during the Defect Liability Period.

38.1.3 Third Party Liability Insurance
Covering bodily injury or death suffered by third Parties including the Employer's personnel, and loss of or damage to property occurring in connection with the supply and installation of the IT Products and/or Services.

38.1.4 Automobile Liability Insurance
Covering use of all vehicles used by the Contractor or its Sub-Contractors, whether or not owned by them, in connection with the execution of the Contract.

38.1.5 Workers' Compensation
In accordance with the statutory requirements applicable in any country where the Contract or any part thereof is executed.

38.1.6 Employer's Liability
In accordance with the statutory requirements applicable in any country where the Contract or any part thereof is executed.

38.1.7 Other Insurances
Such other insurances as may be specifically agreed upon by the Parties hereto as listed in the Appendix to the Contract titled Insurance Requirements.

38.2 The Employer shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GC Sub-Clause 38.1, except for the Third Party Liability, Workers' Compensation and Employer's Liability Insurances, and the Contractor's Sub-Contractors shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GC Sub-Clause 38.1 except for the Cargo Insurance During Transport, Workers' Compensation and Employer's Liability Insurances. All insurers' rights of subrogation against such co-insured for losses or claims arising out of the performance of the Contract shall be waived under such policies.

38.3 The Contractor shall, in accordance with the provisions of the

Appendix to the Contract titled Insurance Requirements, deliver to the Employer certificates of insurance or copies of the insurance policies as evidence that the required policies are in full force and effect. The certificates shall provide that no less than twenty-one (21) days' notice shall be given to the Employer by insurers prior to cancellation or material modification of a policy.

38.4 The Contractor shall ensure that, where applicable, its Sub-Contractor(s) shall take out and maintain in effect adequate insurance policies for their personnel and vehicles and for work executed by them under the Contract, unless such Sub-Contractors are covered by the policies taken out by the Contractor.

38.5 The Employer shall at its expense take out and maintain in effect during the performance of the Contract those insurances specified in the Appendix to the Contract titled Insurance Requirements, in the sums and with the deductibles and other conditions specified in the said Appendix. The Contractor and the Contractor's Sub-Contractors shall be named as co-insured under all such policies. All insurers' rights of subrogation against such co-insured for losses or claims arising out of the performance of the Contract shall be waived under such policies. The Employer shall deliver to the Contractor satisfactory evidence that the required insurances are in full force and effect. The policies shall provide that not less than twenty-one (21) days' notice shall be given to the Contractor by all insurers prior to any cancellation or material modification of the policies. If so requested by the Contractor, the Employer shall provide copies of the policies taken out by the Employer under this GC Sub-Clause 38.5.

38.6 If the Contractor fails to take out and/or maintain in effect the insurances referred to in GC Sub-Clause 38.1, the Employer may take out and maintain in effect any such insurances and may from time to time deduct from any amount due the Contractor under the Contract any premium that the Employer shall have paid to the insurer, or may otherwise recover such amount as a debt due from the Contractor. If the Employer fails to take out and/or maintain in effect the insurances referred to in GC Sub-Clause 38.5, the Contractor may take out and maintain in effect any such insurances and may from time to time deduct from any amount due the Employer under the Contract any premium that the Contractor shall have paid to the insurer, or may otherwise recover such amount as a debt due from the Employer. If the Contractor fails to or is unable to take out and maintain in effect any such insurances, the Contractor shall nevertheless have no liability or responsibility towards the Employer, and the Contractor shall have full recourse against the Employer for any and all liabilities of the Employer herein.

38.7 Unless otherwise provided in the Contract, the Contractor shall prepare and conduct all and any claims made under the policies effected by it pursuant to this GC Clause 38, and all monies payable by any insurers shall be paid to the Contractor. The Employer shall give to the Contractor all such reasonable assistance as may be required by the Contractor. With respect to insurance claims in which the Employer's interest is involved, the Contractor shall not give any release or make any compromise with the insurer without the prior written consent of the Employer. With respect to insurance claims in which the Contractor's interest is involved, the Employer shall not give any release or make any compromise with the insurer without the prior written consent of the Contractor.

39. Unforeseen Conditions

39.1 If, during the execution of the Contract, the Contractor shall encounter on the Site any physical conditions other than climatic conditions, or artificial obstructions that could not have been reasonably foreseen prior to the date of the Contract by an experienced contractor on the basis of reasonable examination of the data relating to the IT Products and/or Services and on the basis of information that it could have obtained from a visual inspection of the Site if access thereto was available, or other data readily available to it relating to the IT Products and/or Services, and if the Contractor determines that it will in consequence of such conditions or obstructions incur additional cost and expense or require additional time to perform its obligations under the Contract that would not have been required if such physical conditions or artificial obstructions had not been encountered, the Contractor shall promptly, and before performing additional work or using additional Contractor's Equipment, notify the Project Manager in writing of:

(a) the physical conditions or artificial obstructions on the Site that could not have been reasonably foreseen;

(b) the additional work required, including the steps which the Contractor will or proposes to take to overcome such conditions or obstructions;

(c) the extent of the anticipated delay; and

(d) the additional cost and expense that the Contractor is likely to incur.

On receiving any notice from the Contractor under this GC Sub-Clause 39.1, the Project Manager shall promptly consult with the Employer and Contractor and decide upon the actions to be taken to overcome the physical conditions or artificial obstructions encountered. Following such consultations, the Project Manager shall instruct the Contractor, with a copy to the Employer, of the actions to be taken.

39.2 Any reasonable additional cost and expense incurred by the Contractor in following the instructions from the Project Manager to overcome such physical conditions or artificial obstructions referred to in GC Sub-Clause 39.1 shall be paid by the Employer to the Contractor as an addition to the Contract Price.

39.3 If the Contractor is delayed or impeded in the performance of the Contract because of any such physical conditions or artificial obstructions referred to in GC Sub-Clause 39.1, the Time for Completion shall be extended in accordance with GC Clause 44 (Extension of Time for Completion).

40. Change in Laws and Regulations

40.1 If, after the date twenty-eight (28) days prior to the date of bid submission, in the country where the Site is located, any law, regulation, ordinance, order or by-law having the force of law is enacted, promulgated, abrogated or changed which shall be deemed to include any change in interpretation or application by the competent authorities, that subsequently affects the costs and expenses of the Contractor and/or the Time for Completion, the Contract Price shall be correspondingly increased or decreased, and/or the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been affected in the performance of any of its obligations under the Contract. Notwithstanding the foregoing, such additional or reduced costs shall not be separately paid or credited if the same has already been accounted for in the price adjustment provisions where applicable, in accordance with the PC pursuant to GC Sub-Clause 11.2.

41. Force Majeure

41.1 "Force Majeure" shall mean any event beyond the reasonable control of the Employer or of the Contractor, as the case may be, and which is unavoidable notwithstanding the reasonable care of the Party affected, and shall include, without limitation, the following:

(a) war, hostilities or warlike operations whether a state of war be declared or not, invasion, act of foreign enemy and civil war

(b) rebellion, revolution, insurrection, mutiny, usurpation of civil or military government, conspiracy, riot, civil commotion and terrorist acts

(c) confiscation, nationalization, mobilization, commandeering or requisition by or under the order of any government or de jure or de facto authority or ruler or any other act or failure to act of any local state or national government authority

(d) strike, sabotage, lockout, embargo, import restriction, port congestion, lack of usual means of public transportation and communication, industrial dispute, shipwreck, shortage or restriction of power supply, epidemics, quarantine and plague

(e) earthquake, landslide, volcanic activity, fire, flood or inundation, tidal wave, typhoon or cyclone, hurricane, storm, lightning, or other inclement weather condition, nuclear and pressure waves or other natural or physical disaster

(f) shortage of labor, materials or utilities where caused by circumstances that are themselves Force Majeure.

41.2 If either Party is prevented, hindered or delayed from or in performing any of its obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances thereof within fourteen (14) days after the occurrence of such event.

41.3 The Party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such Party's performance is prevented, hindered or delayed. The Time for Completion shall be extended in accordance with GC Clause 8.

41.4 The Party or Parties affected by the event of Force Majeure shall use reasonable efforts to mitigate the effect thereof upon its or their performance of the Contract and to fulfill its or their obligations under the Contract, but without prejudice to either Party's right to terminate the Contract under GC Clauses 45 (Suspension), 46 (Termination for Employer's Convenience), 47 (Termination for Contractor's Default), and 48 (Termination by Contractor).

41.5 No delay or nonperformance by either Party hereto caused by the occurrence of any event of Force Majeure shall

(a) constitute a default or breach of the Contract, or

(b) give rise to any claim for damages or additional cost or expense occasioned thereby, subject to GC Sub-Clauses 36.2 (Care of IT Products and/or Services), 41.3, and 42.4 (War Risks)

if and to the extent that such delay or nonperformance is caused by the occurrence of an event of Force Majeure.

41.6 If the performance of the Contract is substantially prevented, hindered or delayed for a single period of more than sixty (60) days or an aggregate period of more than one hundred and twenty (120) days on account of one or more events of Force Majeure during the currency of the Contract, the Parties will attempt to develop a mutually satisfactory solution, failing which either Party may terminate the Contract by giving a notice to the other, but without prejudice to either Party's right to terminate the Contract under GC Sub-Clause 42.5 (War Risks).

41.7 In the event of termination pursuant to GC Sub-Clause 41.6, the rights and obligations of the Employer and the Contractor shall be as specified in GC Sub-Clauses 46.2 and 46.3.

41.8 Notwithstanding GC Sub-Clause 41.5, Force Majeure shall not apply to any obligation of the Employer to make payments to the Contractor herein.

42. War Risks

42.1 "War Risks" shall mean any event specified in paragraphs (a) and (b) of GC Sub-Clause 41.1 and any explosion or impact of any mine, bomb, shell, grenade or other projectile, missile, munitions or explosive of war, occurring or existing in or near the country (or countries) where the Site is located.

42.2 Notwithstanding anything contained in the Contract, the Contractor shall have no liability whatsoever for or with respect to

(a) destruction of or damage to Facilities, or any part thereof;

(b) destruction of or damage to property of the Employer or any third Party; or

(c) injury or loss of life

if such destruction, damage, injury or loss of life is caused by any War Risks, and the Employer shall indemnify and hold the Contractor harmless from and against any and all claims, liabilities, actions, lawsuits, damages, costs, charges or expenses arising in consequence of or in connection with the same.

42.3 If the IT Products and/or Services or any other property of the Contractor used or intended to be used for the purposes of the IT

Products and/or Services shall sustain destruction or damage by reason of any War Risks, the Employer shall pay the Contractor for

(a) any part of the IT Products and/or Services so destroyed or damaged to the extent not already paid for by the Employer and so far as may be required by the Employer, and as may be necessary for completion of the Facilities;

(b) replacing or making good any Contractor's Equipment or other property of the Contractor so destroyed or damaged;

(c) replacing or making good any such destruction or damage to the IT Products and/or Services or any part thereof.

If the Employer does not require the Contractor to replace or make good any such destruction or damage to the IT Products and/or Services, the Employer shall either request a change in accordance with GC Clause 43, excluding the performance of that part of the IT Products and/or Services thereby destroyed or damaged or, where the loss, destruction or damage affects a substantial part of the IT Products and/or Services, shall terminate the Contract, pursuant to GC Clause 46.

If the Employer requires the Contractor to replace or make good on any such destruction or damage to the IT Products and/or Services, the Time for Completion shall be extended in accordance with GC 44.

42.4 Notwithstanding anything contained in the Contract, the Employer shall pay the Contractor for any increased costs or incidentals to the execution of the Contract that are in any way attributable to, consequent on, resulting from, or in any way connected with any War Risks, provided that the Contractor shall as soon as practicable notify the Employer in writing of any such increased cost.

42.5 If during the performance of the Contract any War Risks shall occur that financially or otherwise materially affect the execution of the Contract by the Contractor, the Contractor shall use its reasonable efforts to execute the Contract with due and proper consideration given to the safety of its and its Sub-Contractors' personnel engaged in the work on the Facilities, provided, however, that if the execution of the work on the Facilities becomes impossible or is substantially prevented for a single period of more than sixty (60) days or an aggregate period of more than one hundred and twenty (120) days on account of any War Risks, the Parties will attempt to develop a mutually satisfactory solution, failing which either Party may terminate the Contract by giving a notice to the other.

42.6 In the event of termination pursuant to GC Sub-Clauses 42.3 or 42.5, the rights and obligations of the Employer and the Contractor shall be specified in GC Sub-Clauses 26.2 and 46.3 (Termination for Employer's Convenience).

H. Change in Contract Elements

43. Change in the Facilities

43.1 Introducing a Change

43.1.1 Either Party may seek to vary any obligation of the Contract by making application to the other Party. No amendment or other variation of the Contract shall be effective unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized representative of each party to the Contract.

43.1.2 Subject to GC Sub-Clauses 43.2.5 and 43.2.7, the Employer shall have the right to propose, and subsequently require, that the Project Manager order the Contractor from time to time during the performance of the Contract to make any change, modification, addition or deletion to, in or from the SOR (interchangeably called "Change"), provided that such Change falls within the general scope of the SOR and does not constitute unrelated work and that it is technically practicable, taking into account both the state of advancement of the work against the Agreed and Finalized Project Plan and the technical compatibility of the Change envisaged with the nature of the SOR as originally specified in the Contract.

A Change may involve, but is not restricted to, the substitution of updated IT Products and/or Services and related Services in accordance with GC Clause 23 (Product Upgrades).

43.1.3 The Contractor may from time to time during its performance of the Contract propose to the Employer (with a copy to the Project Manager), any Change that the Contractor considers necessary or desirable to improve the quality or efficiency. The Employer may at its discretion approve or reject any Change proposed by the Contractor.

43.1.4 Notwithstanding GC Sub-Clauses 43.1.2 and 43.1.3, no change made necessary because of any default of the Contractor in the performance of its obligations under the Contract shall be deemed to be a Change, and such change shall not result in any adjustment of the Contract Price or the Time for Operational Acceptance.

43.1.5 The procedure on how to proceed with and execute Changes is specified in GC Sub-Clauses 43.2 and 43.3 (Changes Originating from Employer and Contractor) and further details and forms are provided in the Sample Forms Section in the Bidding Documents.

43.1.6 Moreover, the Employer and Contractor will agree, during development of the Agreed and Finalized Project Plan, to a date prior to the scheduled date for Operational Acceptance after which the SOR shall be "frozen." Any Change initiated after this time will be dealt with after Operational Acceptance.

43.2 Changes Originating from Employer

43.2.1 If the Employer proposes a Change pursuant to GC Sub-Clause 43.1.2, it shall send to the Contractor a "Request for Change Proposal," requiring the Contractor to prepare and furnish to the Project Manager as soon as reasonably practicable a "Change Proposal," which shall include the following:

(a) brief description of the Change;

(b) impact on the Time for Operational Acceptance;

(c) detailed estimated cost of the Change;

(d) effect on Functional Guarantees (if any);

(e) effect on any other provisions of the Contract.

43.2.2 Prior to preparing and submitting the “Change Proposal,” the Contractor shall submit to the Project Manager a “Change Estimate Proposal,” which shall be an estimate of the cost of preparing and submitting the Change Proposal, plus a first approximation of the suggested approach and cost for implementing the changes. Upon receipt of the Contractor’s Change Estimate Proposal, the Employer shall do one of the following:

(a) accept the Contractor’s estimate with instructions to the Contractor to proceed with the preparation of the Change Proposal;

(b) advise the Contractor of any part of its Change Estimate Proposal that is unacceptable and request the Contractor to review its estimate;

(c) advise the Contractor that the Employer does not intend to proceed with the Change.

43.2.3 Upon receipt of the Employer’s instruction to proceed under GC Sub-Clause 43.2.2 (a), the Contractor shall, with proper expedition, proceed with the preparation of the Change Proposal, in accordance with GC Sub-Clause 43.2.1. The Contractor, at its discretion, may specify a validity period for the Change Proposal, after which if the Employer and Contractor have not reached agreement in accordance with GC Sub-Clause 43.2.6, then GC Sub-Clause 43.2.7 shall apply.

43.2.4 The pricing of any Change shall, as far as practicable, be calculated in accordance with the rates and prices included in the Contract. If the nature of the Change is such that the Contract rates and prices are inequitable, the parties to the Contract shall agree on other specific rates to be used for valuing the Change.

43.2.5 If before or during the preparation of the Change Proposal it becomes apparent that the aggregate effect of compliance with the Request for Change Proposal and with all other Change Orders that have already become binding upon the Contractor under this GC Clause would be to increase or decrease the Contract Price as originally set forth in Article 2 (Contract Price) of the Contract by more than the percentage stated in the ITB Clause 42, the Contractor may give a written notice of objection to this Request for Change Proposal prior to furnishing the Change Proposal. If the Employer accepts the Contractor's objection, the Employer shall withdraw the proposed Change and shall notify the Contractor in writing of its acceptance.

The Contractor's failure to so object to a Request for Change Proposal shall neither affect its right to object to any subsequent requested Changes or Change Orders herein, nor affect its right to take into account, when making such subsequent objection, the percentage increase or decrease in the Contract Price that any Change not objected to by the Contractor represents.

43.2.6 Upon receipt of the Change Proposal, the Employer and the Contractor shall mutually agree upon all matters contained in the Change Proposal. Within fourteen (14) days after such agreement, the Employer shall, if it intends to proceed with the Change, issue the Contractor a Change Order. If the Employer is unable to reach a decision within fourteen (14) days, it shall notify the Contractor with details of when the Contractor can expect a decision.

If the Employer decides not to proceed with the Change for whatever reason, it shall, within the said period of fourteen (14) days, notify the Contractor accordingly. Under such circumstances, the Contractor shall be entitled to reimbursement of all costs reasonably incurred by it in the preparation of the Change Proposal, provided that these do not exceed the amount given by the Contractor in its Change Estimate Proposal submitted in accordance with GC Sub-Clause 43.2.2.

43.2.7 If the Employer and the Contractor cannot reach agreement on the price for the Change, an equitable adjustment to the Time for Operational Acceptance, or any other matters identified in the Change Proposal, the change will not be implemented. However, this provision does not limit the rights of either party under GC Clause 52 (Disputes and Arbitration).

43.3 Changes Originating from Contractor

43.3.1 If the Contractor proposes a Change pursuant to GC Sub-Clause 43.1.3, the Contractor shall submit to the Project Manager a written "Application for Change Proposal," giving reasons for the proposed Change and including the information specified in GC Sub-Clause 43.2.1. Upon receipt of the Application for Change Proposal, the Parties shall follow the procedures outlined in GC Clauses 43.2.6 and 43.2.7 except that the words "Change Proposal" shall be read, for the purposes of this GC Sub-Clause 43.3 as "Application for Change Proposal." However, should the Employer choose not to proceed or the Employer and the Contractor cannot come to agreement on the change during any validity period that the Contractor may specify in its Application for Change Proposal, the Contractor shall not be entitled to recover the costs of preparing the Application for Change Proposal, unless subject to an agreement between the Employer and the Contractor to the contrary.

44. Extension of Time for Completion

44.1 The Time(s) for Completion specified in the PC pursuant to GC Sub-Clause 8.2 shall be extended if the Contractor is delayed or impeded in the performance of any of its obligations under the Contract by reason of any of the following:

(a) any Change in the SOR as provided in GC Clause 43;

(b) any occurrence of Force Majeure as provided in GC Clause 41, unforeseen conditions as provided in GC Clause 39, or other occurrence of any of the matters specified or referred to in paragraphs (a), (b), and (c) of GC Sub-Clause 36.2;

(c) any suspension order given by the Employer under GC Clause 45 hereof or reduction in the rate of progress pursuant to GC Sub-Clause 45.2;or

(d) any changes in laws and regulations as provided in GC Clause 40; or

(e) any default or breach of the Contract by the Employer, or any activity, act or omission of the Employer, or the Project Manager, or any other contractors employed by the Employer; or

(f) any delay on the part of a sub-contractor, provided such delay is due to a cause for which the Contractor himself would have been entitled to an extension of time under this sub-clause; or

(g) delays attributable to the Employer or caused by customs; or

(h) any other matter specifically mentioned in the Contract

by such period as shall be fair and reasonable in all the circumstances and as shall fairly reflect the delay or impediment sustained by the Contractor.

44.2 Except where otherwise specifically provided in the Contract, the Contractor shall submit to the Project Manager a notice of a claim for an extension of the Time for Completion, together with particulars of the event or circumstance justifying such extension as soon as reasonably practicable after the commencement of such event or circumstance. As soon as reasonably practicable after receipt of such notice and supporting particulars of the claim, the Employer and the Contractor shall agree upon the period of such extension. In the event that the Contractor does not accept the Employer's estimate of a fair and reasonable time extension, the Contractor shall be entitled to refer the matter to an Arbitrator, pursuant to GC Sub-Clause 52.1.

44.3 The Contractor shall at all times use its reasonable efforts to minimize any delay in the performance of its obligations under the Contract.

44.4 In all cases where the Contractor has given a notice of a claim for an extension of time under GC 44.2, the Contractor shall consult with the Project Manager in order to determine the steps (if any) which can be taken to overcome or minimize the actual or anticipated delay. The Contractor shall there after comply with all reasonable instructions which the Project Manager shall give in order to minimize such delay. If compliance with such instructions shall cause the Contractor to incur extra costs and the Contractor is entitled to an extension of time under GC 44.1, the amount of such extra costs shall be added to the Contract Price.

45. Suspension

45.1 The Employer may request the Project Manager, by notice to the Contractor, to suspend performance of any or all of its obligations under the Contract. Such notice shall specify the obligation of which performance is to be suspended, the effective date of the suspension and the reasons therefore. The Contractor shall thereupon suspend performance of such obligation, except those obligations necessary for the care or preservation of the Facilities, until ordered in writing to resume such performance by the Project Manager.

If, by virtue of a suspension order given by the Project Manager, other than by reason of the Contractor's default or breach of the Contract, the Contractor's performance of any of its obligations is suspended for an aggregate period of more than ninety (90) days, then at any time thereafter and provided that at that time such performance is still suspended, the Contractor may give a notice to the Project Manager requiring that the Employer shall, within twenty-eight (28) days of receipt of the notice, order the resumption of such performance or request and subsequently order a change in accordance with GC Clause 43 (Change in the Facilities), excluding the performance of the suspended obligations from the Contract.

If the Employer fails to do so within such period, the Contractor may, by a further notice to the Project Manager, elect to treat the suspension, where it affects a part only of the Facilities, as a deletion of such part in accordance with GC Clause 43 or, where it affects the whole of the Facilities, as termination of the Contract under GC Clause 46 (Termination for Employer's Convenience).

45.2 If

(a) the Employer has failed to pay the Contractor any sum due under the Contract within the specified period, has failed to approve any invoice or supporting documents without just cause pursuant to the Appendix to the Contract titled Terms and Procedures of Payment, or commits a substantial breach of the Contract, the Contractor may give a notice to the Employer that requires payment of such sum, with interest thereon as stipulated in GC Sub-Clause 12.3, requires approval of such invoice or supporting documents, or specifies the breach and requires the Employer to remedy the same, as the case may be. If the Employer fails to pay such sum together with such interest, fails to approve such invoice or supporting documents or give its reasons for withholding such approval, or fails to remedy the breach or take steps to remedy the breach within fourteen (14) days after receipt of the Contractor's notice or

(b) the Contractor is unable to carry out any of its obligations under the Contract for any reason attributable to the Employer, including but not limited to the Employer's failure to provide possession of or access to the Site or other areas in accordance with GC Sub-Clause 10.2 (Employer's

Responsibilities), or failure to obtain any governmental permit necessary for the execution and/or completion of the Facilities,

then the Contractor may by fourteen (14) days' notice to the Employer suspend performance of all or any of its obligations under the Contract, or reduce the rate of progress.

45.3 If the Contractor's performance of its obligations is suspended or the rate of progress is reduced pursuant to this GC Clause 45, then the Time for Completion shall be extended in accordance with GC Sub-Clause 44.1 (Extension of Time for Completion), and any and all additional costs or expenses incurred by the Contractor as a result of such suspension or reduction shall be paid by the Employer to the Contractor in addition to the Contract Price, except in the case of suspension order or reduction in the rate of progress by reason of the Contractor's default or breach of the Contract.

45.4 During the period of suspension, the Contractor shall not remove from the Site any IT Products and/or Services or part thereof, or any Contractor's Equipment, without the prior written consent of the Employer.

46. Termination for Employer's Convenience

46.1 The Employer may at any time terminate the Contract for any reason by giving the Contractor a notice of termination that refers to this GC Clause 46.

46.2 Upon receipt of the notice of termination under GC Sub-Clause 46.1, the Contractor shall either as soon as practical or upon the date specified in the notice of termination:

(a) cease all further work, except for such work as the Employer may specify in the notice of termination for the sole purpose of protecting that part of the SOR already executed, or any work required to leave the Site in a clean and safe condition;

(b) terminate all subcontracts, except those to be assigned to the Employer pursuant to GC Sub-Clause 46.2(d)(ii) below;

(c) remove all Contractor's Equipment from the Site, repatriate the Contractor's and its Sub-Contractors' personnel from the Site, remove from the Site any wreckage, rubbish and debris of any kind; and

(d) subject to the payment specified in GC Sub-Clause 46.3, shall:

  (i) deliver to the Employer the parts of the SOR executed by the Contractor up to the date of termination;

  (ii) to the extent legally possible, assign to the Employer all right, title and benefit of the Contractor to the IT Products and/or Services, as of the date of termination, and, as may be required by the Employer, in any subcontracts concluded between the Contractor and its Sub-Contractors; and

  (iii) deliver to the Employer all non-proprietary drawings, specifications and other documents prepared by the Contractor or its Sub-Contractors as of the date of termination in connection with the IT Products and/or Services.

46.3 In the event of termination of the Contract under GC Sub-Clause 46.1, the Employer shall pay to the Contractor the following amounts:

(a) the Contract Price, properly attributable to part or whole of the IT Products and/or Services executed by the Contractor as of the date of termination;

(b) the costs reasonably incurred by the Contractor in the removal of the Contractor's Equipment from the Site and in the repatriation of the Contractor's and its Sub-Contractors' personnel;

(c) any amounts to be paid by the Contractor to its Sub-Contractors in connection with the termination of any subcontracts, including any cancellation charges;

(d) costs incurred by the Contractor in protecting the IT Products and/or Services and leaving the Site in a clean and safe condition pursuant to GC Sub-Clause 47.1 (Termination for Contractor's Default); and

(e) the cost of satisfying all other obligations, commitments and claims that the Contractor may in good faith have undertaken with third Parties in connection with the Contract and that are not covered by GC Sub-Clauses 46.3(a) through (d) above.

47. Termination for Contractor's Default

47.1 The Employer, without prejudice to any other rights or remedies it may possess, may terminate the Contract forthwith in the following circumstances by giving a notice of termination and its reasons therefore to the Contractor, referring to this GC Sub-Clause 47.1:

(a) if the Contractor becomes bankrupt or insolvent, has a receiving order issued against it, compounds with its creditors, or, if the Contractor is a corporation, a resolution is passed or order is made for its winding up, (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), a receiver is appointed over any part of its undertaking or assets, or if the Contractor takes or suffers any other analogous action in consequence of debt;

(b) if the Contractor assigns or transfers the Contract or any right or interest therein in violation of the provision of GC Clause 49 (Assignment); or

(c) if the Contractor, in the judgment of the Employer has engaged in corrupt, fraudulent, coercive or collusive practices in competing for or in executing the Contract, including but not limited to willful misrepresentation of facts concerning ownership of Intellectual Property Rights in, or proper authorization and/or licenses from the owner to offer the hardware, software, or materials provided under the Contract.

47.2 If the Contractor

(a) has abandoned or repudiated the Contract;

(b) has without valid reason failed to commence work on the IT Products and/or Services promptly;

(c) persistently fails to execute the Contract in accordance with the Contract or persistently neglects to carry out its obligations under the Contract without just cause;

(d) refuses or is unable to provide sufficient Documentation, Services, or labor to execute and complete the IT Products and/or Services in the manner specified in the Agreed and Finalized Project Plan furnished under GC Clause 19 at rates of progress that give reasonable assurance to the Employer that the Contractor can attain Operational Acceptance of the IT Products and/or Services by the Time for Operational Acceptance as extended;

then the Employer may, without prejudice to any other rights it may possess under the Contract, give a notice to the Contractor stating the nature of the default and requiring the Contractor to remedy the same. If the Contractor fails to remedy or to take steps to remedy the same within fourteen (14) days of its receipt of such notice, then the Employer may terminate the Contract forthwith by giving a notice of termination to the Contractor that refers to this GC Sub-Clause 47.2.

47.3 Upon receipt of the notice of termination under GC Sub-Clauses 47.1 or 47.2, the Contractor shall, either immediately or upon such date as is specified in the notice of termination,

(a) cease all further work, except for such work as the Employer may specify in the notice of termination for the sole purpose of protecting that part of the IT Products and/or services already executed, or any work required to leave the Site in a clean and safe condition;

(b) terminate all subcontracts, except those to be assigned to the Employer pursuant to GC Sub-Clause 47.3(d) below;

(c) deliver to the Employer the parts of the IT Products and/or Services executed by the Contractor up to the date of termination;

(d) to the extent legally possible, assign to the Employer all rights, title and benefit of the Contractor to the IT Products and/or Services or Subsystems as of the date of termination, and, as may be required by the Employer, in any subcontracts concluded between the Contractor and its Sub-Contractors;

(e) deliver to the Employer all drawings, specifications, and other documents prepared by the Contractor or its Sub-Contractors as of the date of termination in connection with the Products and/or Services.

47.4 The Employer may enter upon the Site, expel the Contractor, and complete the Products and/or Services itself or by employing any third Party. Upon completion of the Products and/or Services or at such earlier date as the Employer thinks appropriate, the Employer shall give notice to the Contractor that such Contractor's Equipment will be returned to the Contractor at or near the Site and shall return such Contractor's Equipment to the Contractor in accordance with such notice. The Contractor shall thereafter without delay and at its cost remove or arrange removal of the same from the Site.

47.5 Subject to GC Sub-Clause 47.6, the Contractor shall be entitled to be paid the Contract Price attributable to the portion of the IT Products and/or Services executed as of the date of termination, and the costs, if any, incurred in protecting the IT Products and/or Services and in leaving the Site in a clean and safe condition pursuant to GC Sub-Clause 47.3. Any sums due the Employer from the Contractor accruing prior to the date of termination shall be deducted from the amount to be paid to the Contractor under this Contract.

47.6 If the Employer completes the IT Products and/or Services, the cost of completing the IT Products and/or Services by the Employer shall be determined.

If the sum that the Contractor is entitled to be paid, pursuant to GC Sub-Clause 47.5, plus the reasonable costs incurred by the Employer in completing the IT Products and/or Services, exceeds the Contract Price, the Contractor shall be liable for such excess.

If such excess is greater than the sums due the Contractor under GC Sub-Clause 47.5, the Contractor shall pay the balance to the Employer, and if such excess is less than the sums due the Contractor under GC Sub-Clause 47.5, the Employer shall pay the balance to the Contractor. The Employer and the Contractor shall agree, in writing, on the computation described above and the manner in which any sums shall be paid.

48. Termination by Contractor

48.1 If

(a) the Employer has failed to pay the Contractor any sum due under the Contract within the specified period, has failed to approve any invoice or supporting documents without just cause pursuant to the Appendix to the Contract titled Terms and Procedures of Payment, or commits a substantial breach of the Contract, the Contractor may give a notice to the Employer that requires payment of such sum, with interest thereon as stipulated in GC Sub-Clause 12.3, requires approval of such invoice or supporting documents, or specifies the breach and requires the Employer to remedy the same, as the case may be. If the Employer fails to pay such sum together with such interest, fails to approve such invoice or supporting documents or give its reasons for withholding such approval, fails to remedy the breach or take steps to remedy the breach within fourteen (14) days after receipt of the Contractor's notice, or

(b) the Contractor is unable to carry out any of its obligations under the Contract for any reason attributable to the Employer, including but not limited to the Employer's failure to provide possession of or access to the Site or other areas or failure to obtain any governmental permit necessary for the execution and/or completion of the IT Products and/or Services;

then the Contractor may give a notice to the Employer of such events, and if the Employer has failed to pay the outstanding sum, to approve the invoice or supporting documents, to give its reasons for withholding such approval, or to remedy the breach within twenty-eight (28) days of such notice, or if the Contractor is still unable to carry out any of its obligations under the Contract for any reason attributable to the Employer within twenty-eight (28) days of the said notice, the Contractor may by a further notice to the Employer referring to this GC Sub-Clause 48.1(b), forthwith terminate the Contract.

48.2 The Contractor may terminate the Contract forthwith by giving a notice to the Employer to that effect, referring to this GC Sub-Clause 48.2, if the Employer becomes bankrupt or insolvent, has a receiving order issued against it, compounds with its creditors, or, being a corporation, if a resolution is passed or order is made for its winding up (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), a receiver is appointed over any part of its undertaking or assets, or if the Employer takes or suffers any other analogous action in consequence of debt.

48.3 If the Contract is terminated under GC Sub-Clauses 48.1(b) or 48.2, then the Contractor shall immediately:

(a) cease all further work, except for such work as may be necessary for the purpose of protecting that part of the IT Products and/or Services already executed, or any work required to leave the Site in a clean and safe condition;

(b) terminate all subcontracts, except those to be assigned to the Employer pursuant to GC Sub-Clause 48.3(d)(ii);

(c) remove all Contractor's Equipment from the Site and repatriate the Contractor's and its Sub-Contractors' personnel from the Site; and

(d) subject to the payment specified in GC Sub-Clause 48.4, shall:

(i) deliver to the Employer the parts of the IT Products and/or Services executed by the Contractor up to the date of termination;

(ii) to the extent legally possible, assign to the Employer all rights, title and benefit of the Contractor to the IT Products and/or Services, or Subsystems as of the date of termination, and, as may be required by the Employer, in any subcontracts concluded between the Contractor and its Sub-Contractors, and

(iii) to the extent legally possible, deliver to the Employer all drawings, specifications, and other documents prepared by the Contractor or its Sub-Contractors as of the date of termination in connection with the IT Products and/or Services.

48.4 If the Contract is terminated under GC Sub-Clauses 48.1 or 48.2, the Employer shall pay to the Contractor all payments specified in GC Sub-Clause 46.3, and reasonable compensation for all loss, except for loss of profit, or damage sustained by the Contractor arising out of, in connection with, or in consequence of such termination.

48.5 Termination by the Contractor pursuant to this GC Clause 48 is without prejudice to any other rights or remedies of the Contractor that may be exercised in lieu of or in addition to rights conferred by GC Clause 48.

48.6 In GC Clauses 46 to 48, the expression “portion of the IT Products and/or Services executed” shall include all work executed, Services provided, and all IT Products and/or Services, acquired (or subject to a legally binding obligation to purchase) by the Contractor and used or intended to be used for the purpose of the Contractor and used or intended to be used for the purpose of the IT Products and/or Services, up to and including the date of termination.

48.7 In GC Clauses 46 to 48, in calculating any monies due from the Employer to the Contractor, account shall be taken of any sum previously paid by the Employer to the Contractor under the Contract, including any advance payment paid pursuant to the Appendix to the Contract titled Terms and Procedures of Payment.

49. Assignment

49.1 Neither the Employer nor the Contractor shall, without the express prior written consent of the other Party, which consent shall not be unreasonably withheld, assign to any third Party the Contract or any part thereof, or any right, benefit, obligation or interest therein or thereunder, except that the Contractor shall be entitled to assign either absolutely or by way of charge any monies due and payable to it or that may become due and payable to it under the Contract.

50. Export Restrictions

50.1 Notwithstanding any obligation under the Contract to complete all export formalities, any export restrictions attributable to the Employer, to the country of the Employer or to the use of the IT Products and/or Services to be supplied which arise from trade regulations from a country supplying those IT Products and/or Services, and which substantially impede the Contractor from meeting its obligations under the Contract, shall release the Contractor from the obligation to provide deliveries or services, always provided, however, that the Contractor can demonstrate to the satisfaction of the Employer and of ADB that it has completed all formalities in a timely manner, including applying for permits, authorizations, and licenses necessary for the export of the IT Products and/or Services under the terms of the Contract. Termination of the Contract on this basis shall be for the Employer’s convenience pursuant to GC Clause 46.

I. Claims, Disputes and Arbitration

51. Contractor’s Claims

51.1 If the Contractor considers himself to be entitled to any extension of the Time for Completion and/or any additional payment, under any clause of these General Conditions or otherwise in connection with the Contract, the Contractor shall submit a notice to the Project Manager, describing the event or circumstance giving rise to the claim. The notice shall be given as soon as practicable, and not later than twenty-eight (28) days after the Contractor became aware, or should have become aware, of the event or circumstance.

51.2 If the Contractor fails to give notice of a claim within such period of twenty-eight (28) days, the Time for Completion shall not be extended, the Contractor shall not be entitled to additional payment, and the Employer shall be discharged from all liability in connection with the claim. Otherwise, the following provisions of this Sub-Clause shall apply.

(a) The Contractor shall also submit any other notices which are required by the Contract, and supporting particulars for the claim, all as relevant to such event or circumstance.

(b) The Contractor shall keep such contemporary records as may be necessary to substantiate any claim, either on the Site or at another location acceptable to the Project Manager. Without admitting the Employer’s liability, the Project Manager may, after receiving any notice under this Sub-Clause, monitor the record-keeping and/or instruct the Contractor to keep further contemporary records. The Contractor shall permit the Project Manager to inspect all these records, and shall (if instructed) submit copies to the Project Manager.

(c) Within forty-two (42) days after the Contractor became aware (or should have become aware) of the event or circumstance giving rise to the claim, or within such other period as may be proposed by the Contractor and approved by the Project Manager, the Contractor shall send to the Project Manager a fully detailed claim which includes full supporting particulars of the basis of the claim and of the extension of time and/or additional payment claimed. If the event or circumstance giving rise to the claim has a continuing effect:

(i) this fully detailed claim shall be considered as interim;

(ii) the Contractor shall send further interim claims at monthly intervals, giving the accumulated delay and/or amount claimed, and such further particulars as the Project Manager may reasonably require; and

(iii) the Contractor shall send a final claim within twenty-eight (28) days after the end of the effects resulting from the event or circumstance, or within such other period as may be proposed by the Contractor and approved by the Project Manager.

(d) Within forty-two (42) days after receiving a claim or any further particulars supporting a previous claim, or within such other period as may be proposed by the Project Manager and approved by the Contractor, the Project Manager shall respond with approval, or with disapproval and detailed comments. The Project Manager may also request any necessary further particulars, but shall nevertheless give his/her response on the principles of the claim within such time.

(e) Each payment certificate shall include such amounts for any claim as have been reasonably substantiated as due under the relevant provision of the Contract. Unless and until the particulars supplied are sufficient to substantiate the whole of the claim, the Contractor shall only be entitled to payment for such part of the claim as he has been able to substantiate.

(f) The Project Manager shall agree with the Contractor or estimate:

  (i) the extension (if any) of the Time for Completion (before or after its expiry) in accordance with GC Clause 44 (Extension of time for Completion), and/or

  (ii) the additional payment (if any) to which the Contractor is entitled under the Contract.

(g) The requirements of this Sub-Clause are in addition to those of any other Sub-Clause which may apply to a claim. If the Contractor fails to comply with this or another Sub-Clause in relation to any claim, any extension of time and/or additional payment shall take account of the extent (if any) to which the failure has prevented or prejudiced proper investigation of the claim, unless the claim is excluded under the second paragraph of this Sub-Clause.

(h) In the event that the Contractor and the Employer cannot agree on any matter relating to a claim, either Party may refer the matter to the Disputes and Arbitration procedures pursuant to GC Clause 52 hereof.

52. Disputes and Arbitration

52.1 Adjudication

(a) The parties, within fourteen (14) days of the Effective Date, will agree and appoint an Adjudicator.

(b) If any dispute of any kind whatsoever shall arise between the Employer and the Contractor in connection with or arising out of the Contract, including without prejudice to the generality of the foregoing, any question regarding its existence, validity or termination, or the operation of the IT Products and/or Services (whether during the progress of implementation or after its achieving Operational Acceptance and whether before or after the termination, abandonment, or breach of the Contract), the Parties shall seek to resolve any such dispute or difference by mutual consultation. If the Parties fail to resolve such a dispute or difference by mutual consultation, within fourteen (14) days after one Party has notified the other in writing of the dispute or difference, then, if the Contract in Appendix includes and names an Adjudicator, the dispute shall be referred in writing by either Party to the Adjudicator, with a copy to the other Party. If there is no Adjudicator specified in the Contract, the mutual consultation period stated above shall last twenty-eight (28) days (instead of 14), upon expiry of which either Party may move to the notification of arbitration pursuant to GC Sub-

Clause 52.2(a).

(c) The Adjudicator shall give his or her decision in writing to both Parties within twenty-eight (28) days of a dispute being referred to the Adjudicator. If the Adjudicator has done so, and no notice of intention to commence arbitration has been given by either the Employer or the Contractor within fifty-six (56) days of such reference, the decision shall become final and binding upon the Employer and the Contractor. Any decision that has become final and binding shall be implemented by the Parties forthwith.

(d) The Adjudicator shall be paid an hourly fee at the rate specified in Appendix 2 (Adjudicator) to the Contract, plus reasonable expenditures incurred in the execution of duties as Adjudicator, and these costs shall be divided equally between the Employer and the Contractor.

(e) Should the Adjudicator resign or die, or should the Employer and the Contractor agree that the Adjudicator is not fulfilling his or her function in accordance with the provision of the Contract, a new Adjudicator shall be jointly appointed by the Employer and the Contractor. Failing agreement between the Parties within twenty-eight (28) days, the new Adjudicator shall be appointed at the request of either Party by the Appointing Authority specified in the Appendix to the Contract titled Adjudicator, or, if no Appointing Authority is specified in the Contract, shall, from this point onward and until the Parties may otherwise agree on an Adjudicator or an Appointing Authority, be implemented as if there is no Adjudicator.

52.2 Arbitration

(a) If either the Employer or the Contractor is dissatisfied with the Adjudicator’s decision, or if the Adjudicator fails to give a decision within twenty-eight (28) days of a dispute being referred to him or her, then the Employer or the Contractor may, within fifty-six (56) days of such reference, give notice to the other Party, with a copy for information to the Adjudicator, of its intention to commence arbitration, as provided below, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given.

(b) Any dispute in respect of which a notice of intention to commence arbitration has been given, in accordance with GC Sub-Clause 52.2(a), shall be finally settled by arbitration. Arbitration may be commenced prior to or after delivery of the IT Products and/or Services.

(c) Arbitration proceedings shall be conducted in accordance with the rules of procedures specified in the Appendix to the Contract titled Adjudicator.

52.3 Notwithstanding any reference to the Adjudicator or arbitration in this clause,

(a) the parties shall continue to perform their respective obligations under the Contract unless they otherwise agree;

(b) the Employer shall pay the Contractor any monies due the Contractor.

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 - DRAFT CONTRACTS
SYSTEM CONTROL AND SERVICE PROVIDER
SECTION 8 – PARTICULAR CONDITIONS (APPENDIX 1)

March 2020

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

SECTION VIII:
APPENDIX 1 TO PARTICULAR CONDITIONS

1. Definitions

The Term of the Contract is 128 months comprising 8 months for the completion of Works and 10 years of services/operations period following the Commencement Notice. The Term shall be the time period for the supply and installation of all the hardware and software included under Schedule 1 to Schedule 5 to be completed as per PC, Sub Clause 8.1.2 plus the services period of ten (10) years post design, supply, installation of all the equipment reckoned from the Commencement Notice.

The Bank is: Asian Development Bank

The Borrower is: Islamic Republic of Pakistan

Country of Origin is: A*ll countries and territories as indicated in Section V of the bidding documents, Eligible Countries*.

The Employer is: TransKarachi [*include address*]

Email: [•]

Cc to [•]

Facsimile: [•]

The Employer's Country is: Islamic Republic of Pakistan.

The Employer's Representative is: Chief Executive Officer (TransKarachi) or any other person nominated by TransKarachi from time to time.

The Project Site(s) *is/are* as specified in the Implementation Schedule in the Schedule of Requirements.

5. Law and Language

5.1 The Contract shall be governed by and interpreted in accordance with the laws of: the Islamic Republic of Pakistan.

5.2 The ruling language is: English.

5.3 The language for communications is: English.

8. Time for Commencement and Completion

8.1.1 The Contractor shall commence the Works within **Twenty-One (21) days** from the Effective Date for determining Time for Completion of Works as specified in the Contract Agreement.

8.1.2 The Time for Completion of designated parts or the whole of the Works shall be

i) Design, Supply, Installation, Testing and Commissioning of all the equipment involving hardware, software and supporting infrastructure (mentioned in SOR) within 8 months after commencement of work in accordance with PCC, 8.1.1.

ii) Operation and Maintenance Services for ITS, FC and SM shall be contracted for a period of ten (10) years starting from the Services Commencement Notice in accordance with PCC, 8.2.1 excluding partial service delivery time during the 8 months mentioned in clause 8.1.2

9. Contractor's Responsibilities

9.7 Where the Contractor is a joint venture, consortium or association of two or more persons, all such persons *shall* jointly and severally bound to the Employer for the fulfilment of the provisions of the Contract.

13. Securities

13.2 The Contractor shall provide, within twenty-eight (28) days of the notification of Contract award, an Advance Payment Security in the amount and currency of the Advance Payment specified in the Contract Agreement.

The Advance Payment Security shall remain valid till the Completion of Works.

13.3 The Contractor shall provide within twenty-eight (28) days of the notification of Contract award, and subsequently maintain and renew until ninety (90) days after the end of the Term, a Performance Security denominated in Pakistani rupees for an amount equal to:

- Until ninety (90) days after Completion, ten percent (10%) of the Contract Price comprising amounts in Schedule 1, 2, 3, 4 and 5 and Services cost for first twelve months from Schedule 6 and Recurrent cost (if any);
- From the ninety-first (91st) day after Completion up to two (2) Years after Completion, two hundred million Pakistani rupees (PKR 200,000,000); and
- Thereafter, the greater of two hundred million Pakistani rupees (PKR 200,000,000) and the two (2)-Year monthly average of payments due to the Contractor multiplied by two (2); for purposes of this clause, the two (2) Years to be used in determining the two (2)-Year monthly average shall be the twenty-four-month period immediately preceding the month before the month in which the determination is being made.

The Performance Security shall have a term of two (2) years and shall be renewed or replaced no later than sixty (60) days before its expiry. Such renewed or replacement Performance Security shall be delivered to the Employer no later than forty-five (45) days prior to the expiry of the existing Performance Security. On receiving the replacement Performance Security, the Employer shall return the previously provided Performance Security to the Contractor within thirty (30) days.

15 Intellectual Property and Copyright

15.3 The Employer may assign, license, or otherwise voluntarily transfer its contractual rights to use the Standard Software or elements of the Standard Software, without the Contractor's prior written consent, under the following circumstances: None

15.4 The Employer's and Contractor's rights and obligations with respect to Custom Software or elements of the Custom Software are as follows: Not Applicable

The Employer's and Contractor's rights and obligations with respect to Custom Materials or elements of the Custom Materials are as follows: Not Applicable

15.5 If not applicable, state: *No software escrow contract is required for the execution of the Contract.*

16 Software Licence Agreements

16.1(a)(iii) The Standard Software license shall be valid throughout the territory of the Employer's Country.

16.1(a)(iv) Use of the software shall be subject to the following additional restrictions:

16.1(b)(ii) The Software license shall permit the Software to be used or copied for use or transferred to a replacement computer(s) or users *provided the replacement computer(s) or users falls within approximately the same class of machine and maintains approximately the same number of users, if a multi-user machine.*

16.1(b)(vi) The Software license shall permit the Software to be disclosed to and reproduced for use (including a valid sublicense) by *other necessary and appropriate support entities and terms* subject to the same restrictions set forth in this Contract.

16.1(b)(vii) In addition to the persons specified in PC Sub-Clause 16.1(b)(vi), the Software may be disclosed to, and reproduced for use by, persons identified by Employer's Representative subject to the same restrictions as are set forth in this Contract.

16.2 The Contractor's right to audit the Standard Software will be subject to the following terms:

22: Transport and Delivery

22.5 The Contractor shall provide the Employer with shipping and other documents *as specified in the GCC*.

23: Product Upgrades

23.4 The Contractor shall provide the Employer *with all new versions, releases, and updates to all Standard Software during the Warranty Period, for free, as specified in the GCC*.

28 Completion Time Guarantee

28.2 Liquidated damages shall be assessed at 0.5 % of the Contract Price (Schedule 1 to 5 only) per day (or part thereof) of delay in Completion of Works. The maximum liquidated damages are 10% of the Contract Price (Schedule 1 to 5 only), or relevant part of the Contract Price if the liquidated damages apply to defined part of the Products and/or Services.

28.3 Liquidated damages shall be assessed only with respect to achieving the requisite milestone corresponding to the Products and/or Services as specified in the Implementation Schedule.

29 Defect Liability, Hand Over and Final Certificate

29.2(c) All the items supplied and installed under the contract have been in the market for at least three years notwithstanding this shall not limit the Employer's right to receive the latest model as per contract.

29.3 The Warranty Period shall commence from the Service Commencement of the Products and/or Services and shall remain valid for *the Term of the Contract*.

29.10 During the Warranty Period, the Contractor must commence the work necessary to remedy defects or damage within time specified in the SOR.

33 Limitation of Liability

33.1(b) The multiplier of the Contract Price is: **1.25**.

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 - DRAFT CONTRACTS
SYSTEM CONTROL AND SERVICE PROVIDER
SECTION 8 – PARTICULAR CONDITIONS

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

March 2020

SECTION VIII: PARTICULAR CONDITIONS

Section VIII - Particular Conditions of Contract

The following Particular Conditions of Contract (PC) shall supplement Section VII the General Conditions of Contract (GC). Whenever there is a conflict, the provisions herein shall prevail over those in the GC.

Definitions	"Agreed and Finalized Project Plan" means the Contractor's plan for undertaking and completing the works as required to be submitted pursuant to Sub-Clause 19.1. "Bank" means Asian Development Bank (ADB). "Commissioning" delete the definition in its entirety and replace with "means the testing, checking and other requirements specified in the SOR that are to be carried out by the Contractor in preparation for commencement of operation of the System (or any component part) as provided in GC Sub-Clause 27.1 (Commissioning) hereof." "Completion" delete the definition in its entirety and replace with "means that the Works (or specific part(s) thereof where specific parts are specified in the Agreed and Finalized Project Plan) have been completed (including the submission of all Documentation if required by the SOR)." "Completion Certificate" add new defined term and define as "means the written certification provided by the Employer to the Contractor which certifies that the Completion (and/or interim milestones as specified in the Agreed and Finalized Project Plan) has been achieved." "Contract" means the binding agreement between the Employer and the Contractor which is comprised of the Contract Documents. "Contract Agreement" add new defined term and define as "means the document so titled (which shall include its Appendices 1-14) which forms part of the Contract between the Employer and the Contractor." "Contract Documents" delete the definition in its entirety and replace with "means the documents listed in Article 1.1 (Contract Documents) of the Contract Agreement (including any amendments thereto)." "Contract Period" delete this defined term in its entirety. "Contract Price" delete the definition in its entirety and replace with "means the sum specified in Article 2.1 (Contract Price) of the Contract Agreement, subject to such additions and adjustments thereto or deductions there from, as may be made pursuant to the Contract." "Coverage Period" delete this defined term in its entirety. "Day" replace with "day"

	"Defect" delete the definition in its entirety and replace with "means an imperfection or flaw that impairs worth or utility of the Product and/or the Works." "Defect Liability Period" delete this defined term in its entirety and replace the term "Defect Liability Period" throughout the document with the term "Warranty Period." "Designated Operating Environment" delete this defined term in its entirety. "Documentation" delete the words "See also Standard Documentation and Custom Documentation." "Effective Date" replace the Word "Contract" with the words "Contract Agreement" "Employer" means TransKarachi including its legal successors or permitted assigns of TransKarachi". "Employer's Country" means "Islamic Republic of Pakistan". "Employer's Representative" insert new defined term and define as "means the person appointed by the Employer in the manner provided in GC Sub-Clause 18.1 (Employer's Representatives) hereof and named as such Appendix 1 to the PC to perform the duties delegated by the Employer." "Facilities" delete this defined term in its entirety. "Functional Guarantees" delete this defined term in its entirety. "Final Certificate" insert new defined term and define as "means the written certification provided by the Employer to the Contractor at the end of the Term pursuant to Clause 29 (Defect Liability, Hand Over and Final Certificate). "General Purpose Software" delete this defined term in its entirety. "Implementation Schedule" delete this defined term in its entirety and replace throughout the Contract with the Agreed and Finalized Project Plan. "Installation Services" delete this defined term in its entirety. "Operational Acceptance" delete this defined term in its entirety and replace with the term Completion. "Operation Acceptance Certificate" delete this defined term in its entirety. "Operational Acceptance Test" delete this defined term in its entirety. "Packaged Software" delete this defined term in its entirety. "Precommissioning" delete this defined term in its entirety. "Preventive Maintenance" delete this defined term in its entirety. "Post Warranty Services Period" delete this defined term in its entirety. "Product" Replace the term "IT Products" with the word "Products" throughout the document and delete the definition of Products in its entirety and replace with "means a product deliverable specified in the SOR which is to be supplied to the Employer by or on behalf of the Contractor, including but not limited to

equipment's, all information processing and security/communications-related Hardware, Software, consumable items, plans and/or any supporting documentation, and including such integrations and configurations as are required to perform its function."

"Project Manager" delete this defined term in its entirety and replace the term "Project Manager" with the term "Employer's Representative" throughout the document.

"Project Plan" delete the definition in its entirety and replace with "means the set of tasks required to achieve Completion, as described in the Agreed and Finalized Project Plan.

"Rental Items" delete this defined term in its entirety.

"Reserve Fund" insert new defined term and define as "means the fund to be established as a security in accordance with GC Sub-Clause 13.4.

"Services Commencement" insert new defined term and define as "means commencement of the Services or any part thereof by the Contractor, following the issuance of Services Commencement Notice by the Employer."

"Services Commencement Notice" insert new defined term and define as "means a notice issued by the Employer to the Contractor pursuant to GC Sub-Clause 8.1.

"Schedule of Requirements" delete this defined term in its entirety.

"Services" delete the definition in its entirety and replace with "means all operation and maintenance, technical, logistical, management, operations, consultancy and any other services as specified in the SOR to be commence upon issuance of the Services Commencement Notice."

"Software Support Services" delete this defined term in its entirety.

"SOR" insert new defined term and define as "means the Schedule of Requirements and is included at Appendix 14 of the Contract."

"Standard Documentation" delete this defined term in its entirety.

"System" delete the definition in its entirety and replace with "means the combination of installed Products and Services which are fully integrated so as to operate together to deliver the complete requirements of the Employer."

"Time for Operational Acceptance" delete this defined term in its entirety.

"Term" insert new defined term and define as "means the term of this Contract as specified in Appendix 1 to the PC"

"Training Schedule" delete this defined term in its entirety.

"Warranty Period" delete the definition in its entirety and replace with "means the period by which the Contractor warrants its Products and/or Works will remain defect-free, and any remediation of any defect that arises in this period will be the responsibility of the Contractor and costs of such remediation will be

	borne by the Contractor from the time period starting from Completion and shall extend for the length of time specified in Appendix 1 to the PC. “Works” insert new defined term and define as “means the design to the extent required and the procurement, delivery, installation and commissioning of the Products to be supplied and installed, sufficient for the Contractor to be entitled to receive the Completion Certificate under the Contract. The Works shall also include the works undertaken during the Warranty Period in order to address any defect or damage in accordance with the terms hereof.” “Year” delete the definition in its entirety and replace with “means three hundred sixty-five (365) days”
GC 2.1	Delete in its entirety and replace with the following text: All documents forming part of the Contract (and all parts thereof) are intended to be correlative, complementary and mutually explanatory. The Contract shall be read as a whole.
GC 2.2(b)	Delete sub clause and replaced with the following text; the Contract Agreement and Appendices 1 to 7 and 9 to 14 attached to the Contract;
GC 2.2(c)	Delete the following text; “and it Appendices”
GC 4.2	Delete in its entirety and replace with the following text: When a certificate is issued to a Party, the certifier shall send a copy to the other Party. When a notice is issued to a Party, by the other Party or the Employer’s Representative, a copy shall be sent to the Employer’s Representative or the other Party, as the case may be.
GC 7	Delete the word “Facilities” from the sub-clause title and replace the word “Facilities” throughout the document with the word “Works.”
GC 8	Delete in its entirety and replace with the following text: “8.1 Works 8.1.1 The Contractor shall commence work on the Works within the period specified in Appendix 1 to the PC and shall thereafter proceed with the Works in accordance with the time schedule specified in the Agreed and Finalized Project Plan. 8.1.2 The Contractor shall attain Completion of the Works, or of a component part thereof where a separate time for Completion of such part is specified in the Agreed and Finalized Project Plan, within the time specified in the Agreed and Finalized Project Plan (as may be extended from time to time under GC Clause 44 (Extension of Time for Completion) hereof). 8.2 Services

	8.2.1 Upon the issuance of a Services Commencement Notice, the Contractor shall promptly commence providing the relevant Service(s). The Employer shall issue the Services Commencement Notice on completion of whole of the Work or for the part of the Works (as the case may be). 8.2.2 The Contractor shall continue to perform the Services until the end of the Term in accordance with the SOR and the Agreed and Finalized Project Plan.
GC 9.2	Delete in its entirety and replace with the following text: The Contractor confirms that it has entered into this Contract on the basis of a proper examination of the Employer's existing equipment, installations and including reviewing any hardware, software and data interfaces as provided by the Employer, and on the basis of information that the Contractor could have obtained from an inspection of the Site and of other data readily available to it relating to the Works. The Contractor acknowledges that any failure to acquaint itself with all such data and information shall not relieve its responsibility for properly estimating the difficulty or cost of successfully performing the Contract.
GC 9.4	Delete the first sentence and replace with the following text: The Contractor shall comply with all laws in force in the country where the Products, Works and/or Services are to be delivered/installed.
GC 9.6	Delete in its entirety and replace with the following text: The Contractor shall permit ADB and/or the Employer to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by their auditors.
GC 10.1	Delete in its entirety and replace with the following text: The Employer shall use its best endeavors to ensure the accuracy of all information and/or data to be supplied by the Employer to the Contractor, except when otherwise expressly stated in the Contract.
GC 10.2	Delete in its entirety and replace with the following text: The Employer shall be responsible for timely provision of all resources, information, and decision making under its control that are necessary to reach an Agreed and Finalized Project Plan (pursuant to GC Sub-Clause 19 (Project Planning and Performance) within the time schedule specified in the Implementation Plan in the SOR. The Contractor shall give the Employer immediate notice if the delay in providing any such resources, information, and decision making is likely to cause any delay to the delivery/installation of the Products, Works and/or performance of Services.
GC 10.4	Insert new sub-Clause "d)" d) The Contractor shall acquire, on behalf of Employer, and pay for all permits, approvals and/or licenses from all local, state or national government authorities when specified in the SOR.
GC 10.8	Delete the words "the Implementation Schedule and"

GC 10.10	Delete in its entirety
GC. 10.11	Delete the last sentence beginning with “Following Commissioning” and ending with “for backups”
GC 10.12	Delete in its entirety.
GC 10.13	Delete in its entirety.
GC 11.1	Delete in its entirety and replace with the following text: The Contract Price shall be as specified in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement. Unless agreed otherwise in writing the Contract Price shall be - Fixed for Works, Products and related services - Adjustable for Services
GC 11.2	Delete in its entirety and replace with the following text: The Contract Price shall be a firm lump sum not subject to any alteration, except in the event of a Change in the SOR or as otherwise provided in the Contract.
GC 12.2	Delete in its entirety and replace with the following text: The Contract Price, and any other payments due by the Employer to the Contractor, shall be paid as specified in Appendix 7 (Terms and Procedures of Payment) to the Contract.
GC 12.4	Delete in its entirety.
GC 13.2 (a)	Delete the words “IT Products and/or Services achieved Operational Acceptance” and replace with the words “date specified in Appendix 1 to the PC.”
GC 13.3(c)	Delete in its entirety and replace with the following text: The performance security shall automatically become null and void once all the obligations of the Contractor under the Contract have been fulfilled as indicated by the issuance of a Final Certificate, including, but not limited to, any obligations during the Warranty Period and any extensions to the period. The security shall be returned to the Contractor no later than twenty-eight (28) days after its expiration.
GC 13.3(d)	Delete in its entirety and replace with the following: The Contractor shall, no later than thirty (30) days prior to its expiry, replace, renew or extend (as appropriate) the performance security until the Employer issues the Final Certificate to the Contractor.”
GC 13.4(N)	Add new clause as follows: 13.4 Reserve Fund

	(a) (a) The Contractor shall establish the Reserve Fund which shall be maintained by the Employer as security against amounts which may become due and payable to the Employer during the Term. (b) The Reserve Fund shall be built up from amounts retained by the Employer from payments due to the Contractor. The Employer shall retain no more than [three percent (3%) of each payment due to the Contractor, up to PKR 100,000,000 (one hundred million). (c) The Employer shall be entitled to, in accordance with the express terms of this Contract, make withdrawals from the Reserve Fund. Prior to making any withdrawal from the Reserve Fund, the Employer shall have notified the Contractor of the Contractor's breach of a specific obligation under the Contract, and shall also provide relevant details in respect of the breach (including the details of the Contractor's failure to remedy the breach within the time agreed and/or specified by the Employer). (d) The Employer shall, prior to making a withdrawal or as soon as practicable following a withdrawal from the Reserve Fund, provide details of the amount to be withdrawn or the amount that has been withdrawn, and purpose of use. Following a withdrawal, the Contractor shall, within the period specified by the Employer or agreed between the Parties, replenish the Reserve Fund so that it is maintained at no less than the amount referred to in Sub-Clause 13.4(b). Failure of the Contractor to replenish the Reserve Fund following a withdrawal pursuant to this Clause shall constitute a material breach of this Contract. (e) The Employer shall return to the Contractor any amount remaining in the Reserve Fund if upon the expiry of the Term no amounts are due and/or payable to the Employer under this Contract and the Contractor has successfully completed all handing over procedures in accordance with Sub-Clause 29. (f) The Employer shall return to the Contractor any amount remaining in the Reserve Fund if upon the early termination of the Contractor's employment under the Contract no amounts are due and/or payable to the Employer under this Contract.
GC 14.1	Delete in its entirety and replace with the following text: The Employer shall be entirely responsible for all taxes, stamp duties, license fees, and other such levies, payable in the Employer's country for Product and/or Services provided from outside the Employer's country.
GC 14.4	Insert the following at the end of this clause: For purposes of this sub-clause the term "Tax" as used herein includes all taxes, duties, levies and charges except any income tax or other similar tax assessed based on the generation of income
GC 18.2.2	Delete in its entirety and replace with the following text:

	Subject to the extensions and/or limitations specified in the SOR (if any), the Contractor's Representative shall have the authority to represent the Contractor on all day-to-day matters relating to the Contract. The Contractor's Representative shall give to the Employer's Representative all the Contractor's notices, instructions, information, and all other communications under the Contract.
GC 19.1	Delete in its entirety and replace with the following text: The Contractor shall within thirty (30) days of the Effective Date, develop, in close cooperation with the Employer, and based on the Preliminary Project Plan included in the Contractor's bid, an Agreed and Finalized Project Plan encompassing the activities specified in the SOR and the activities required to complete the delivery, installation, commissioning and operation of the System.
GC 19.2	Delete in its entirety and replace with the following text: The Agreed and Finalized Project Plan will be prepared by the Contractor for approval by the Employer. The Employer shall be entitled to propose revisions to the Agreed and Finalized Project Plan to, among other things, include interim milestones.
GC 19.3	Delete in its entirety.
GC 19.4	Delete in its entirety and replace with the following text: The Contractor shall undertake to supply, install, test, commission, operate and maintain the System in accordance with the SOR and Agreed and Finalized Project Plan.
GC 19.7	Insert new Sub-Clause as follows: The Employer shall be entitled to liquidate the performance security in whole or in part for any material breach by the Contractor of its obligations under the Contract (including its obligation to extend the performance security prior to its expiry pursuant to Sub-Clause 13.3). Materiality for purposes of this clause shall be determined by the Employer. To the extent there is a material breach by the Contractor of any of its obligations under the Contract, the Contractor shall be entitled (upon request of the Employer) to remedy such breach to the satisfaction of the Employer. If the Contractor fails to remedy such breach to the satisfaction of the Employer within fourteen (14) days (or such other time as may be agreed by the parties) of receiving notice requiring it to remedy such breach, the Employer shall be entitled terminate the Contract and/or to liquidate wholly or partially the performance security on first written demand to the guarantor of the performance security.
GC 20.5	Delete in its entirety and replace with the following text: If a Sub-Contractor's obligations extend beyond the expiry of the Term and the Employer's Representative, prior to that date, instructs the Contractor to assign the benefits of such obligations to the Employer, then the Contractor shall do so.
GC 21.1.1	Delete in its entirety and replace with the following text:

	The Contractor shall design to the extent required in the Contract, install, commission, operate and maintain the System in compliance with the provisions of the Contract or, where not so specified, in accordance with good industry practice. This shall include, to the extent required for the proper operation of the System, the integration of the System into any existing software and/or hardware infrastructure. Prior to executing this Contract, the Contractor shall satisfy itself that the System is capable of properly integrating into any existing hardware/software infrastructure at the Project Site and that it can achieve seamless operability of the System and performance of its obligations under this Contract.
GC 21.1.2	Delete in its entirety.
GC 21.5.2	Delete in its entirety and replace with the following text: The Employer's Representative shall not disapprove any document, except on the grounds that there is insufficient information upon which to base its approval and additional information is required or the document does not fully comply with the Contract or that it is contrary to good engineering practice.
GC 22.4.1	Delete in its entirety and replace with the following text: The Contractor shall provide such packing of the Products as is required to prevent their damage or deterioration during shipment. The packing, marking, and documentation within and outside the packages shall comply strictly with applicable law and the Employer's instructions to the Contractor.
GC 22.6.1	Insert new sentence at the end of last sentence. During operation and maintenance phase of the Contract i.e. after Service Commencement Notice, the Contractor shall be responsible for custom clearance and all the costs in association with such custom clearance for any items or goods (if any) to be supplied from abroad required in order to fulfill the Contractor's contractual obligation
GC 22.6.2 (b)	Delete this sub clause in its entirety.
GC 23.4	Delete this sub-clause in its entirety.
GC 23.5	Delete this sub-clause in its entirety.
GC 24	Delete this clause in its entirety.
GC 25.3	Delete this sub-clause in its entirety and replace with the following text: Whenever the Contractor is ready to carry out any such test and/or inspection, the Contractor shall give at least ten (10) days advance notice of such test and/or inspection and of the place and time thereof to the Employer's Representative. The Contractor shall obtain from any relevant third Party or manufacturer any necessary permission or consent to enable the Employer and the Employer's Representative or their designated representatives to attend the test and/or inspection.
GC 25.6	Delete this sub-clause in its entirety and replace with the following text:

	The Employer's Representative may require the Contractor to carry out any test and/or inspection not required by the Contract, provided that the Contractor's reasonable costs and expenses incurred in the carrying out of such test and/or inspection shall be added to the Contract Price. Further, if such test and/or inspection impede the progress of work and/or the Contractor's performance of its other obligations under the Contract, due allowance will be made in respect of the applicable Time for Completion and the other obligations so affected.
GC 25.7	Delete this sub-clause in its entirety and replace with the following text: If any component of the Products and/or Services fails to pass any test and/or inspection, the Contractor shall either rectify or replace such component and shall, at its own cost, repeat the test and/or inspection upon giving a notice under GC Sub-Clause 25.3
GC 26	Delete this clause in its entirety.
GC 27	Re-title this clause as "Completion of Installation and Works." Delete this clause in its entirety and replace with the following text: The Contractor shall notify the Employer in writing as soon as the Products have been installed and made ready for operation in accordance with the SOR, and the Agreed and Finalized Project Plan. The Employer shall issue the Completion Certificate in respect of the Works (or relevant parts thereof) to the Contractor stating the date of the Completion if it determines that all the Works (or relevant parts thereof) have been completed in accordance with the Contract, all Documentation has been supplied, and that the Works (or relevant parts thereof) are ready for operation.
GC 28(N)	Insert new clause titled "Commissioning" here with the following text: Commissioning of the Products shall be commenced and completed by the Contractor as specified in the Technical Requirements (included in the SOR) and/or the Agreed and Finalized Project Plan.
GC 28.2	Delete this sub-clause in its entirety and replace with the following text: If the Contractor fails to supply, install, commission, and commence operation of the Products and/or Services within the time specified in the Agreed and Finalized Project Plan, or any extension of the time for commencing such operations granted by the Employer under GC Clause 44 (Extension of Time for Completion), the Contractor shall pay to the Employer liquidated damages at the rate specified in Appendix 1 to the PC as a percentage of the Contract Price, or the relevant part of the Contract Price if the Products and/or Services (or components thereof) has not achieved its designated milestone as indicated in the Agreed and Finalized Project Plan. The aggregate amount of such liquidated damages shall in no event exceed the amount specified in Appendix 1 to the PC ("the Maximum"). Once the Maximum is reached, the Employer may consider termination of the Contract, pursuant to GC Sub-Clause 47 (Termination for Contractor's Default).
GC 28.3	Delete this sub-clause in its entirety and replace with the following text:

	Unless otherwise specified in Appendix 1 to the PC, liquidated damages payable under GC Sub-Clause 28.2 shall apply only to the failure to achieve the requisite milestone corresponding to the delivery of the Products, Works and/or Services as specified in the Agreed and Finalized Project Plan. This GC Sub-Clause 28.3 shall not limit, however, any other rights or remedies the Employer may have under the Contract for other delays.
GC 28.4	Delete this sub-clause in its entirety and replace with the following text: The payment of liquidated damages shall not in any way relieve the Contractor from any of its obligations to complete the delivery of the Products, Works and/or Services or from any other of its obligations and liabilities under the Contract.
GC 29	Re-title this clause "Defect Liability, Hand-Over and Final Certificate."
GC 29.1	Delete this sub-clause in its entirety and replace with the following text: The Contractor warrants that for the period specified in the SOR, all Products, Works, (including any Documentation), and/or Services (to the extent relevant) to be delivered under this contract: (a) shall be free from defects in the design, engineering, and workmanship; (b) are newly manufactured, unused, and incorporate all recent material improvements in design; and (c) complies with or exceeds the Technical Specifications in the SOR. Exceptions and/or limitations, if any, to this warranty with respect to Software (or categories of Software), shall be as specified in the PC. Commercial warranty provisions of products supplied under the Contract shall apply to the extent that they do not conflict with the provisions of this Contract.
GC 29.2(c)	Delete this sub-clause in its entirety and replace with the following text: those specific items identified in Appendix 1 to the PC (if any) have been in the market for at least the minimum periods specified in Appendix 1 to the PC (if so specified).
GC 29.3	Delete this sub-clause in its entirety and replace with the following text: The Warranty Period shall commence from Completion and shall extend for the length of time specified in Appendix 1 to the PC.
GC 29.4	Delete this sub-clause in its entirety and replace with the following text: If during the Warranty Period any defect as described in GC Sub-Clause 29.1 should be found in the design, engineering, Documentation, and workmanship of the Products, Works and/or Services provided by the Contractor, the Contractor shall promptly, in consultation and agreement with the Employer regarding appropriate remedying of the defects, and at its sole cost, repair, replace, or otherwise make good such defect as well as any damage to the Products, Works and/or Services caused by such defect.
GC 29.5	Delete this sub-clause in its entirety and replace with the following text:

	The Contractor shall, at its own cost, also be responsible for the repair, replacement, or making good of any defect or of any damage to the Products, Works and/or Services arising out of or resulting from use, operation and/or maintenance of the Product and/or Service. The Contractor shall be responsible for repairing and making good any defect or damage occurring during the Warranty Period whether such defect or damage is notified by the Employer or the Employer's Representative, or observed by the Contractor himself. If Products, Works and/or Services require repair/replacement or making good of any defect and are not so repaired/replaced by the Contractor within a reasonable time or the time determined by the Employer, the Employer shall be entitled to either liquidate the performance security for purposes of effecting such repairs/replacement and/or access the Reserve Fund for purposes of effecting such repairs/replacement. Any usage of the Reserve Fund by the Employer shall obligate the Contractor to replenish the Reserve Fund to the required and/or agreed levels.
GC 29.6	Delete this sub-clause in its entirety and replace with the following text: In the event that any repairs, replacement or making good any defect or damage to the Products and/or Works and the Parties disagree about the cause of such defect and/or damage, the Contractor shall promptly make such repairs and pursue any remedy it believes it is entitled to in accordance with the terms of the Contract.
GC 29.9	Delete this sub-clause in its entirety and replace with the following text: If such part fails the tests, the Contractor shall carry out further repair, replacement, or making good (as the case may be) until that part of the Product passes such tests.
GC29.10	Delete this sub-clause in its entirety and replace with the following text: If the Contractor fails to commence the work necessary to remedy such defect or any damage to the Product caused by such defect within the time period specified in Appendix 1 to the PC (if so specified), the Employer may, following notice to the Contractor, proceed to do such work or contract a third party (or parties) to do such work, and the reasonable costs incurred by the Employer in connection with such work shall be paid to the Employer by the Contractor or may be deducted by the Employer from the Reserve Fund or from any monies due the Contractor or claimed under the performance security (refer to GC Sub-Clause 13.3 (Performance Security) and Sub-Clause 13.4 (Reserve Fund)).
GC 29.12	Delete the words "by the Defect Liability Period" from this sub-clause.
GC 29.13	Delete this sub-clause in its entirety and replace with the following text: No later than one hundred eighty (180) days prior to the expiry of the Term, the Contractor shall commence the handing over procedures as detailed in the SOR (if so specified otherwise devised before expiry of the Term). The Parties shall agree on times and places to undertake joint inspection of the various parts of the System in accordance with the SOR. The Contractor shall provide

	all assistance, documents and other information, electricity, equipment, consumables, materials and suitably qualified and experienced staff, as are necessary to carry out the handing over efficiently and safely. The handing over should also include the handing over of all as-built drawings, operation and maintenance manuals, and all files, records and reports in relation to the System as further specified in the SOR. In the event that, as a result of a inspection of the System any part of it is found to be defective, items less of asset register, or otherwise not in accordance with the Contract, the Employer may by notice require that the defective portions of the System be remedied by the Contractor at its own cost before handing over is completed. Upon receipt of the notice, the Contractor shall, within the period instructed by the Employer and at its own risk, remedy the defects and ensure that the defective portions of the System comply with the Contract.
GC 29.14	Insert new clause as follows: Once the handover is complete and the Contract has been fully performed, the Contractor shall be entitled to receive the Final Certificate. The Contract shall not be considered completed until: (a) any tests required to be undertaken by the terms of the Contract have been passed; (b) any and all repairs required to be made in accordance with the terms of the Contract have been made; (c) any and all documents and/or reports required by the Contract to be submitted and/or delivered to the Employer or on behalf of the Employer have been submitted/delivered and approved; (d) any training that is required to be given by the Contractor to the Employer's staff/personnel or persons designated by the Employer have been satisfactorily given; and (e) any and all existing warranties and/or sub-contracts in connection with the System has been novated and/or assigned to the Employer as required by the Employer.
GC 30	Delete this clause in its entirety.
GC 32.5	Delete this clause in its entirety and replace with the following text: The Employer shall indemnify and hold harmless the Contractor and its employees, officers and Sub-Contractors from and against any and all losses, liabilities, and costs incurred in defending such a claim that the Contractor or its employees, officers, or Sub-Contractors may suffer as a result of any infringement or alleged infringement of any Intellectual Property Rights arising out of or in connection with any design, data drawing, specification, or other documents or materials provided to the Contractor in connection with this Contract by the Employer or any persons (other than the Contractor) contracted by the Employer, except to the extent that such losses, liabilities, and costs arise as a result of the Contractor's breach of GC Sub-Clause 32.8.

GC 32.8	Delete this sub-clause in its entirety and replace with the following text: If any proceedings are brought or any claim is made against the Contractor arising out of the matters referred to in GC Sub-Clause32.5, the Contractor shall promptly give the Employer notice of such proceedings or claims, and the Employer may at its own expense and in the Contractor's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim. If the Employer fails to notify the Contractor within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Contractor shall be free to conduct the same on its own behalf. Unless the Employer has failed to notify the Contractor within the twenty-eight (28) days, the Contractor shall make no admission that may be prejudicial to the defense of any such proceedings or claim. The Contractor shall, at the Employer's request, afford all available assistance to the Employer in conducting such proceedings or claim and shall reimbursed by the Employer for all reasonable expenses incurred in so doing.
GC 33.1(a)	Delete this sub-paragraph in its entirety and replace with the following text: Neither Party shall be liable to the other Party, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, which may be suffered by the other Party in connection with the Contract, and
GC 34.1	Delete this sub-clause in its entirety and replace with the following text: The Contractor warrants that it has disclosed and will continue to disclose during the Term full details of all criminal convictions and all pending criminal charges against it or any of its personnel, associates or Sub-Contractors that would reasonably be expected to adversely affect the Contractor or the Contractor's capacity to fulfill its obligations under this Contract. The Contractor is not required to provide information to the Employer in a form or in a manner which would cause the Contractor to breach the privacy of any of its personnel but the Contractor will take all reasonable steps to either: (a) provide sufficient information to enable the Employer to assess the level of any risk or conflict posed to it by the existence of such conviction or pending charge; or (b) take such steps as necessary to ensure that the person who is the subject of the conviction or pending charge ceases to be directly or indirectly involved with this Contract
GC 36.1	Delete this sub-clause in its entirety and replace with the following text: The Contractor shall be responsible for the care and custody of the Products or any part thereof until the date of Completion pursuant to GC Clause 27 (Completion of Installation and Works) and shall make good at its own cost any loss or damage that may occur to the Products or the relevant part thereof from any cause whatsoever during such period. The Contractor shall also be responsible for any loss or damage to the Products caused by the Contractor or its Sub-Contractors in the course of any work carried out, pursuant to GC Clause 29 (Defect Liability, Hand-Over and Final Certificate). Notwithstanding the foregoing, the Contractor shall not be liable for any loss or damage to the Products or that part thereof caused by reason of any of the matters specified

	or referred to in paragraphs (a), (b) and (c) of GC Sub-Clauses 36.2 and 40.1 (War Risks). The Contractor shall also be responsible for the care and custody of the products or any part thereof from Notice of Commencement to Completion.
GC 37.2	Delete this sub-clause in its entirety and replace with the following text: Subject to GC Sub-Clause 37.3 the Contractor shall indemnify and hold harmless the Employer and its employees and officers from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, in respect of the death or injury of any person or loss of or damage to any property other than the Products whether accepted or not, arising in connection with the supply, installation and/or operation of the Products and/or Services and by reason of the negligence of the Contractor or its Sub-Contractors, or their employees, officers or agents, except any injury, death or property damage caused by the negligence of the Employer, its contractors, employees, officers or agents.
GC 37.4	Delete this sub-clause in its entirety and replace with the following text: The Employer shall indemnify and hold harmless the Contractor and its employees, officers and Sub-Contractors from any and all losses, liabilities, and costs (including losses, liabilities, and costs incurred in defending a claim alleging such a liability) that the Contractor or its employees, officers, or Sub-Contractors may suffer as a result of the death or personal injury of any person or loss of or damage to property of the Employer, other than the Works not yet achieving the Completion, that is caused by fire, explosion, or any other perils, in excess of the amount recoverable from insurances procured under GC Clause 38 (Insurance), provided that such fire, explosion, or other perils were not caused by any act or failure of the Contractor.
GC 38.1.1	Delete and replace as follows: As applicable, 110 percent of the price of the Products covering the Products at the Site from all risks of physical loss or damage (excluding only perils commonly excluded under "all risks" insurance policies of this type of reputable insurers) occurring prior to the Completion.
GC 38.1.3	Delete and replace as follows: Covering bodily injury or death suffered by third Parties including the Employer's personnel, and loss of or damage to property occurring in connection with the supply, installation and/or operation of the Products and/or Services.
GC 40.1	Delete and replace as follows: If, after the date twenty-eight (28) days prior to the date of bid submission, in the country where the Site is located, any law, regulation, ordinance, order or by-law having the force of law is enacted, promulgated, abrogated or changed which shall be deemed to include any change in interpretation or application by the competent authorities, that subsequently affects the costs and expenses of the Contractor and/or the Time for Completion, the Contract Price shall be correspondingly increased or decreased, and/or the Time for Completion shall

	be reasonably adjusted to the extent that the Contractor has thereby been affected in the performance of any of its obligations under the Contract. Notwithstanding the foregoing, such additional or reduced costs shall not be separately paid or credited if the same has already been accounted for in the price adjustment provisions where applicable, in accordance with the PC pursuant to GC Sub-Clause 11.2.
GC43	Retitle as “Change in the Works and/or Services”
GC 43.1.2	Delete and replace as follows: Subject to GC Sub-Clauses 43.2.5 and 43.2.7, the Employer shall have the right to propose, and subsequently require, that the Employer’s Representative order the Contractor from time to time during the performance of the Contract to make any change, modification, addition or deletion to, in or from the SOR (interchangeably called “Change”), provided that such Change falls within the general scope of the SOR and does not constitute unrelated work and that it is technically practicable, taking into account both the state of advancement of the work against the Agreed and Finalized Project Plan and the technical compatibility of the Change envisaged with the nature of the SOR as originally specified in the Contract. A Change may involve, but is not restricted to, the substitution of updated Products, Works and/or Services and related Services in accordance with GC Clause 23 (Product Upgrades). The Employer shall be entitled to instruct changes pursuant to this Clause 43 and such instructed change shall be promptly implemented by the Contractor.
GC 43.2.1(d)	Delete this sub-paragraph in its entirety.
GC 43.2.2	Delete the words “estimate of the cost of preparing and submitting the Change Proposal plus a first”
GC 43.2.6	Delete and replace as follows: Upon receipt of the Change Proposal, the Employer and the Contractor shall mutually agree upon all matters contained in the Change Proposal. Within fourteen (14) days after such agreement, the Employer shall, if it intends to proceed with the Change, issue the Contractor a Change Order. If the Employer is unable to reach a decision within fourteen (14) days, it shall notify the Contractor with details of when the Contractor can expect a decision. If the Employer decides not to proceed with the Change for whatever reason, it shall, within the said period of fourteen (14) days, notify the Contractor accordingly.
GC 43.2..7	Delete and replace as follows: If the Employer and the Contractor cannot reach agreement on the price for the Change, an equitable adjustment to the Time for Completion, or any other matters identified in the Change Proposal the Employer shall be entitled to instruct the Contractor to implement the change (and the Contractor shall be obligated to implement) and the Contractor shall be entitled to pursue its corresponding entitlements in accordance with GC Clause 52 (Disputes and Arbitration).

GC 44.1	Replace the words “the PC” with the words “the Contract”
GC 44.5	Insert new sub-clause as follows: The Contractor shall give the Employer notice of any event or circumstance of which it is aware which is likely to impact the cost of providing the Products, Works and/or Services or the Time for Completion sufficiently in advance of the occurrence of such event and/or circumstance.
GC 45.1	Insert the word “consecutive” in between the words “more than ninety (90)” and “days, then at any time”
GC 45.2	Delete and replace as follows: If (a) the Employer has failed to pay the Contractor any sum due under the Contract within the specified period or has failed to approve any invoice or supporting documents without just cause pursuant to the Appendix to the Contract titled Terms and Procedures of Payment, the Contractor may give a notice to the Employer requesting payment of such sum, or approval of such invoice or supporting documents as the case may be. If the Employer fails to pay such sum or fails to approve such invoice or supporting documents or give its reasons for withholding such approval within fourteen (14) days after receipt of the Contractor’s notice or (b) the Contractor is unable to carry out any of its obligations under the Contract for any reason attributable to the Employer, including but not limited to the Employer’s failure to provide all resources, information, and decision making under its control in accordance with GC Sub-Clause 10.2 (Employer’s Responsibilities), or failure to obtain any governmental permit necessary for the execution and/or completion of the Works, then the Contractor may by fourteen (14) days’ notice to the Employer suspend performance of all or any of its obligations under the Contract, or reduce the rate of progress.
GC 47.2(d)	Delete and replace as follows: refuses or is unable to provide sufficient Documentation, Services, or labor to execute and complete the delivery of the Products, and/or the Works and/or Services in the manner specified in the Agreed and Finalized Project Plan furnished under GC Clause 19 at rates of progress that give reasonable assurance to the Employer that the Contractor can attain the Completion by the Time for Completion as extended;
GC 47.6	Delete and replace as follows: If the Employer completes the delivery of the Products, Works and/or Services, the cost of completing the delivery of the Products, Works and/or Services by the Employer shall be determined. If the sum that the Contractor is entitled to be paid, pursuant to GC Sub-Clause 47.5 plus the reasonable costs incurred by the Employer in completing the delivery of the Products, Works and/or Services, exceeds the Contract Price, the Contractor shall be liable for such excess.

	If such excess is greater than the sums due the Contractor under GC Sub-Clause 47.5 the Contractor shall pay the balance to the Employer, and if such excess is less than the sums due the Contractor under GC Sub-Clause 47.5, the Employer shall pay the balance to the Contractor.
GC 48.1(a)	Delete and replace as follows: If the Employer has failed to pay the Contractor any sum due under the Contract within the specified period, or has failed to approve any invoice or supporting documents without just cause pursuant to the Appendix to the Contract titled Terms and Procedures of Payment, or commits a substantial breach of the Contract, the Contractor may give a notice to the Employer that requires payment of such sum, requires approval of such invoice or supporting documents, or specifies the breach and requires the Employer to remedy the same, as the case may be. If the Employer fails to pay such sum, fails to approve such invoice or supporting documents or give its reasons for withholding such approval, fails to remedy the breach or fails to take steps to remedy the breach within fourteen (14) days after receipt of the Contractor's notice, or
GC 49.1	Delete and replace as follows: The Contractor shall not, without the express prior written consent of the Employer, which consent shall not be unreasonably withheld, assign to any third Party the Contract or any part thereof, or any right, benefit, obligation or interest therein or thereunder, except that the Contractor shall be entitled to assign either absolutely or by way of charge any monies due and payable to it or that may become due and payable to it under the Contract.
GC 50.1	Delete and replace as follows: Notwithstanding any obligation under the Contract to complete all export formalities, any export restrictions attributable to the Employer, to the country of the Employer or to the use of the Products and/or Services to be supplied which arise from trade regulations from a country supplying those Products, Works and/or Services, and which substantially impede the Contractor from meeting its obligations under the Contract, shall release the Contractor from the obligation to provide deliveries or services, always provided, however, that the Contractor can demonstrate to the satisfaction of the Employer and of ADB that it has completed all formalities in a timely manner, including applying for permits, authorizations, and licenses necessary for the export of the Products, Works and/or Services under the terms of the Contract.

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUTS 2.3 AND 5.3 - DRAFT CONTRACTS

SYSTEM CONTROL AND SERVICE PROVIDER

SECTION 9 – CONTRACT FORMS

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

March 2020

SECTION IX: CONTRACT FORMS

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* To be added by the Employer over and above the bid price which is exclusive of the GST

1. Contract Agreement

THIS CONTRACT AGREEMENT is made the *[nth]* day of ***[****month & Year].*

BETWEEN

(1) *[TransKarachi], a Company incorporated under the laws of Islamic Republic of Pakistan and having its principal place of business at [address of Employer]* (hereinafter called "the Employer"),

and

(2) *[Name of Contractor],* a *corporation* incorporated under the laws of *[country of Contractor]* and having its principal place of business at *[address of Contractor]* (hereinafter called "the Contractor").

WHEREAS the Employer desires to engage the Contractor *to supply, install, test, commission and maintain the ITS, Fare Collection, Station Management and Bicycle Sharing System(s) (Hardware and Software) and to provide corresponding services for Karachi Red Line Bus Rapid Transit (BRT) System,* and the Contractor has agreed to such engagement upon and subject to the terms and conditions in the Contract including this Contract Agreement. NOW IT IS HEREBY AGREED as follows:

Article 1.

Contract Documents

1.1 Contract Documents (Reference GC Clause 2)

The following documents, listed in highest to lowest priority, shall constitute the Contract between the Employer and the Contractor, and each shall be read and construed as an integral part of the Contract:

a) *This Contract Agreement (including its Appendices)*

b) *Appendix 14 - Schedule of Requirements (including Implementation Schedule)*

c) *Particular Conditions of Contract and the Appendix to Particular Conditions*

d) *General Conditions of Contract*

e) *The Contractor's bid and original Price Schedules*

f) Any remaining documents that are expressly stated as forming part of the agreement but not included in the above.

1.2 Definitions (Reference GC Clause 1)

Capitalized words and phrases used in this Contract Agreement shall have the same meanings as are ascribed to them in the GC.

Article 2.

Contract Price and Terms of Payment

2.1 Contract Price (GC Clause 11)

The Employer hereby agrees to pay to the Contractor the Contract Price in consideration of the performance by the Contractor of its obligations under the Contract.

The Contract Price shall amount to the sum of PKR [*insert*] and USD [*insert*].

The Contract Price shall be understood to reflect the terms and conditions used in the specification of prices in the detailed price schedules, including the terms and conditions of the associated Incoterms, and the taxes, duties and related levies if and as identified.

2.2 Terms of Payment (GC Clause 12)

The terms and procedures of payment according to which the Employer will reimburse the Contractor are given in the Appendix 7 (Terms and Procedures of Payment) to the Contract.

Article 3.

Effective Date for Determining Time for Completion

3.1 Effective Date (GC Clause 1.1)

The Time for Completion shall be determined from the date when all of the following conditions have been fulfilled:

(a) This Contract Agreement has been duly executed for and on behalf of the Employer and the Contractor;

(b) The Contractor has submitted to the Employer the advance payment security and performance security, in accordance with GC Clause 13.2 and GC Clause 13.3;

(c) The Employer has paid the Contractor the advance payment, in accordance with GC Clause 13.2;

Each party shall use its best efforts to fulfill the above conditions for which it is responsible as soon as practicable.

3.2 If the conditions listed under 3.1 above are not fulfilled (and or expressly waived by the Employer) within two (2) months from the date of this Contract Agreement because of reasons not attributable to the Contractor, the parties shall discuss and agree on an equitable adjustment to the Contract Price and the Time for Completion and/or other relevant conditions of the Contract.

Article 4.

Communication

4.1 The address of the Employer for notice purposes, pursuant to GC 4.1 is: *[Insert address]*.

4.2 The address of the Contractor for notice purposes, pursuant to GC 4.1 is: *[Insert address].*

Article 5.

Appendices

5.1 The applicable Appendices listed below shall be deemed to form an integral part of this Contract Agreement.

5.2 Reference in the Contract to any Appendix shall mean the applicable Appendices listed below and attached to this Contract Agreement, and the Contract shall be read and construed accordingly.

APPENDICES

Appendix 1	Contractor’s Representative [refer GC 18.2]
Appendix 2	Adjudicator [refer GC 50.1]
Appendix 3	List of Approved Sub-Contractors [refer GC 20.1]
Appendix 4	Categories of Software [refer GC Definition & Section IV Form]
Appendix 5	Custom Documentation [refer GC Definition & Section IV Form]
Appendix 6	Revised Price Schedules (if any)
Appendix 7	Terms and Procedures for Payment [refer GC 12.1]
Appendix 8	Agreed and Finalized Project Plan [refer GC 19]
Appendix 9	List of Documents for Approval and Review [refer GC 21.3]
Appendix 10	[not used]
Appendix 11	Insurance Requirements [refer GC 38.1]
Appendix 12	Price Adjustment during Services
Appendix 13	Software License Agreement [refer GC 16]
Appendix 14	Schedule of Requirements [refer GC 19]

IN WITNESS WHEREOF the Employer and the Contractor have caused this Contract Agreement to be duly executed by their duly authorized representatives the day and year first above written.

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* To be added by the Employer over and above the bid price which is exclusive of the GST

For and on behalf of the Employer

Signed:

in the capacity of *[: title or other appropriate designation]*

in the presence of

For and on behalf of the Contractor

Signed:

in the capacity of *[: title or other appropriate designation*]

in the presence of

CONTRACT AGREEMENT

dated the *[: number]* day of *[: month], [: year]*

BETWEEN

[: name of Employer], “the *Employer*”

and

*[: name of Contracto**r**],* “the Contractor”

Appendix 1. Contractor’s Representative

In accordance with GC Clause 1.1, the Contractor’s Representative is:

Name: *[: name and provide title and address further below or state “to be nominated within fourteen (14) days of the Effective Date”]*

Title: *[if appropriate,: title]*

In accordance with GC Clause 4, the Contractor's addresses for notices under the Contract are:

Address of the Contractor's Representative: *[as appropriate,: personal delivery, postal, cable, telegraph, telex, facsimile, electronic mail, and/or EDI addresses.]*

Fallback address of the Contractor: *[as appropriate,: personal delivery, postal, cable, telegraph, telex, facsimile, electronic mail, and/or EDI addresses.]*

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* To be added by the Employer over and above the bid price which is exclusive of the GST

Appendix 2. Adjudicator

In accordance with GC Clause 1.1, the agreed-upon Adjudicator is:

Name: *TBN by Pakistan Engineering Council*

Title: *TBN*

Address: *[: postal address]*

Telephone: *[: telephone]*

The agreed-upon fees and reimbursable expenses are:

As per PEC Guidelines namely “Rules of Conciliation and Arbitration”.

Appendix 3. List of Approved Sub-Contractors

The Employer has approved use of the following Sub-Contractors nominated by the Contractor for carrying out the item or component of the Products and/or Services indicated. Where more than one Sub-Contractor is listed, the Contractor is free to choose between them, but it must notify the Employer of its choice sufficiently in advance of the time when the subcontracted work needs to commence to give the Employer reasonable time for review. In accordance with GC Clause 20.1, the Contractor is free to submit proposals for Sub-Contractors for additional items from time to time. No sub-contracts shall be placed with any such Sub-Contractors for additional items until the Sub-Contractors have been approved in writing by the Employer and their names have been added to this list of Approved Sub-Contractors, subject to GC Clause 20.3.

[specify: item, approved Sub-Contractors, and their place of registration that the Contractor proposed in the corresponding attachment to its bid and that the Employer approves that the Contractor engage during the performance of the Contract. Add additional pages as necessary]

Item	**Approved Sub-Contractors**	**Place of Registration**

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* To be added by the Employer over and above the bid price which is exclusive of the GST

Appendix 4. Categories of Software

The following table assigns each item of Software supplied and installed under the Contract to one of the three categories: (i) System Software, (ii) General-Purpose Software, or (iii) Application Software; and to one of the two categories: (i) Standard Software or (ii) Custom Software.

	(select one per item)			**(select one per item)**	
Software Item	**System Software**	**General-Purpose Software**	**Application Software**	**Standard Software**	**Custom Software**

Appendix 5. Custom Documentation

The following table specifies the Custom Documentation the Contractor will provide under the Contract.

Custom Documentation

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* To be added by the Employer over and above the bid price which is exclusive of the GST

Appendix 6. Revised Price Schedules

The attached Revised Price Schedules (if any) shall form part of this Contract Agreement and, where differences exist, shall supersede the Price Schedules contained in the Contractor’s Bid. These Revised Price Schedules reflect any corrections or adjustments to the Contractor’s bid price, pursuant to the ITB Clauses 35.3, 36.4, and 42.1.

Appendix 7. Terms and Procedures for Payment

The Employer shall pay the Contractor according to the categories and in the manner specified below.

(a) Contract Price (Price Schedule Nos. 1, 2, 3, 4 and 5)

Ten percent (10%) of the Contract Price shall be paid upon receipt of an invoice by the Employer accompanied by the Advance Payment Security specified in GC Clause 13.2.

Fifty percent (50%) of the entire Contract Price shall be paid against Delivery in Peshawar upon receipt of an invoice by the Employer.

Twenty percent (20%) of the entire Contract Price shall be paid against Installation in Peshawar upon receipt of an invoice by the Employer.

Twenty percent (20%) of the entire Contract Price shall be paid against Completion upon receipt of an invoice by the Employer.

The Contract Price shall be paid directly by ADB under Direct Payment method to the Contractor.[1] Payments shall be made promptly by the Employer, but in no case later than forty-five (45) days after submission of a valid invoice by the Contractor.

(b) Recurrent Costs (Price Schedule No. 6)

For each Month (m) following Services Commencement Notice, the Contractor shall be entitled to a payment (**Monthly Payment**) calculated in accordance with the following formula:

$$\mathbf{Monthly\ Payment}_{\mathbf{m}}$$

$$= \left(\mathbf{Variable\ Fee\ Percentage} \times \mathbf{Fare\ Receipts}_{\mathbf{m}} + \frac{\mathbf{Stations}_{\mathbf{m}}}{\mathbf{Stations}_{\mathbf{Total}}} \times \mathbf{Fixed\ Fee} \times \frac{\mathbf{CPI}_{\mathbf{y}}}{\mathbf{CPI}_{\mathbf{2019}}}\right)$$

$$\times (\mathbf{1} - \mathbf{Performance\ Payout\ Percentage} \times \mathbf{Performance\ Deduction\ Percentage}_{\mathbf{m}}) - \mathbf{RF}$$

where:

Variable Fee Percentage means zero percent (0%) if no Completion has yet occurred upon the last day of Month (m) and two point five percent (2.5%) otherwise.

Fare Receipts $_m$ means the sum of all stored values sales and single journey ticket sales during Month (m) as recorded from the System (recorded on Validator).

Stations $_m$ means the number of Stations at which Services were provided on the first day of Month (m).

Stations $_{Total}$ means the total number of Stations, which shall be thirty-one (31).

Fixed Fee means the annual subtotal for Y1 as included in Schedule No. 6 of Appendix 6 divided by twelve (12).

CPI $_y$ means the Consumer Price Index applicable for the specific year, which shall be the average general Consumer Price Index for the month of December (year-on-year basis) of the preceding year as published by the Pakistan Bureau of Statistics, or in case it ceases to be published any equivalent index as agreed by the Parties. For the first adjustment, **CPI$_y$** will be accounted for December 01, 2020.

CPI $_{2019}$ means the Consumer Price Index applicable for the year 2019, which shall be the average general Consumer Price Index for the month of December 2018 as published by the Pakistan Bureau of Statistics. For subsequent years, CPI $_y$ and CPI $_{2019}$ will change accordingly i.e. CPI $_{2019}$ will change to CPI $_{2020}$ for next year and so on. Subject to above, adjustment will be made only once in a year in month of December.

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[1] *Note for Bidders: As part of the discussions around the Agreed and Finalized Project Plan, the Employer may agree to a subdivision of those milestones into sub-milestones in order to cater for the possibility of partial Delivery, Installation or Completion. Unless otherwise agreed by the Employer, the subdivision shall be pro rata to the number of Stations for which the Products have been delivered, installed or completed.*

Performance Payout Percentage means ten percent (10%).

Performance Deduction Percentage $_m$ means the Performance Deduction Percentage applicable to the Contractor for Month (m).

RF means any amount to be retained in relation to the provisioning of the Reserve Fund.

After being notified by the Employer of the Performance Deduction Percentage for Month (m) in accordance with the provisions of the SOR, the Contractor shall raise an invoice to the Employer for an amount equivalent to the Monthly Payment for Month (m) (plus any applicable Sales Tax on Services), and shall send a copy of such invoice to the Fund Manager. The Monthly Payment for Month (m) shall be made by the Fund Manager within five (5) Business Days of it receiving such copy. The Employer will notify Performance Deduction Percentage within 10 days of receipt of Contractor invoice.

Monthly payment under the Recurrent Costs category will be paid in local currency only.

Appendix 8. Agreed and Finalized Project Plan

[Agreed and Finalized Plan to be inserted]

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* To be added by the Employer over and above the bid price which is exclusive of the GST

Appendix 9. List of Documents for Approval and Review

Pursuant to GC Sub-Clause 21.3, the Contractor shall prepare, or cause its Sub-Contractor to prepare, and present to the Employer's Representative the following documents for

A. Approval

High-Level Design (HLD)
Test Plans
Completion Test Report
Agreed and Finalized Project Plan including approval of Schedules of Delivery
Detailed BOQ with Unit prices and Costs Breakup

B. Review

High-Level Design (HLD)
System Design Specifications (SDD)
Material Selection Documentation
Installation and User Manuals
Training Manuals
Test Documentation
As-Built Documentation
Operation and Maintenance Documentation
O&M Manuals
User Manuals
System Administration Manuals
Test Reports

Appendix 10. Functional Guarantees

Not Applicable.

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* To be added by the Employer over and above the bid price which is exclusive of the GST

Appendix 11. Insurance Requirements

Insurances to be taken out by the Contractor

In accordance with the provisions of GC Clause 38.1, the Contractor shall at its expense take out and maintain in effect, or cause to be taken out and maintained in effect, during the performance of the Contract, not later than 56 days from the commencement of works, the insurances set forth below in the sums and with the deductibles and other conditions specified. The identity of the insurers and the form of the policies shall be subject to the approval of the Employer, such approval not to be unreasonably withheld.

(a) Cargo Insurance

Covering loss or damage occurring, while in transit from the Contractor's or manufacturer's works or stores until arrival at the Site, to the Products (including spare parts there for) and to the construction equipment to be provided by the Contractor or its Sub-Contractors.

Amount [in currency(ies)]	**Deductible limits [in currency(ies)]**	**Parties insured[1] [names]**	**From [place]**	**To [place]**
Equivalent to CIP or EXW Price as applicable of items to be supplied under the contract plus 15%	Up to 10% of sum insured	Contractor and Employer	Origin	Site
Equivalent to Price of Contractor's Products, if any plus 15%	Up to 10% of sum insured	Contractor	Origin	Site

(b) Installation All Risks Insurance

Covering physical loss or damage to the Products and/or Services at the Site, occurring prior to Completion of the Works, with extended maintenance coverage for the Contractor's liability in respect of any loss or damage occurring during the Warranty Period while the Contractor is on the Site for the purpose of performing its obligations during the Warranty Period.

Amount [in currency(ies)]	**Deductible limits [in currency(ies)]**	**Parties insured[1] [names]**	**From [place]**	**To [place]**
Equivalent to CIP or EXW Price as applicable of items to be supplied under the contract plus 15%	Up to 10% of sum insured	Contractor and Employer	Origin	Site

(c) Third Party Liability Insurance

Covering bodily injury or death suffered by third parties (including the Employer's personnel) and loss of or damage to property (including the Employer's property and any parts of the Facilities that have been accepted by the Employer) occurring in connection with the supply, installation and/or operation of the Products and/or Services.

Amount [in currency(ies)]	**Deductible limits [in currency(ies)]**	**Parties insured[1] [names]**	**From [place]**	**To [place]**
US$ 8500 for death* US$ 1500 for injury*	Up to 3% of sum insured	Contractor	Origin	Site

10% of Contract Price**	Up to 3% of sum insured	Contractor and Employer	Site	Site

(d) Automobile Liability Insurance

Covering use of all vehicles used by the Contractor or its Sub-Contractors (whether or not owned by them) in connection with the performance of the Contract. Comprehensive insurance in accordance with statutory requirements.

(e) Workers' Compensation

In accordance with the statutory requirements applicable in any country where the Contract or any part thereof is performed.

(f) Employer's Liability

In accordance with the statutory requirements applicable in any country where the Contract or any part thereof is performed.

(g) Other Insurances

The Contractor is also required to take out and maintain at its own cost the following insurances: The Contractor shall maintain Professional Liability Insurance for the ITS, FS and SM and Bike Sharing services with minimum coverage of 1.15 x [Annual (12 months) cost of Services to be offered under Price Schedule No. 6]

Amount [in currency(ies)]	Deductible limits [in currency(ies)]	Parties insured[1] [names]	From [place]	To [place]
Equivalent to Contractor's cost of Services for 12-month period based on the cost from Schedule 6, plus 15%	Upto 10% of sum insured	Contractor	Origin	Site

The Employer shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GC Sub-Clause 38.1, except for the Third Party Liability, Workers' Compensation and Employer's Liability Insurances, and the Contractor's Sub-Contractors shall be named as co-insured's under all insurance policies taken out by the Contractor pursuant to GC Sub-Clause 38.1, except for the Cargo Insurance During Transport, Workers' Compensation and Employer's Liability Insurances. All insurers' rights of subrogation against such co-insureds for losses or claims arising out of the performance of the Contract shall be waived under such policies.

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* To be added by the Employer over and above the bid price which is exclusive of the GST

Appendix 12. Price Adjustment

The prices are to remain firm and fixed for Price Schedule Nos. 1, 2, 3, 4 and 5 during the Term of the Contract if otherwise not mentioned in the Contract.

The prices in Price Schedule No. 6 would be adjusted in accordance with Appendix 7.

Appendix 13. Software License Agreement

[Agreed license to be inserted or attached]

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* To be added by the Employer over and above the bid price which is exclusive of the GST

Appendix 14. Schedule of Requirements

[SOR as per Section VI to be attached or inserted]

2 Performance and Advance Payment Security Forms

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* To be added by the Employer over and above the bid price which is exclusive of the GST

2.1 Performance Security Form (Bank Guarantee)

[Bank's Name, and Address of Issuing Branch or Office]

Beneficiary: *[Name and Address of Employer]*

Date: *[date]*

PERFORMANCE GUARANTEE No.: *[Performance Guarantee Number]*

We have been informed that on *[date of award]* you awarded Contract No. *[Contract number]* for *[title and/or brief description of the Contract]* (hereinafter called "the Contract") to *[complete name of Contractor]* (hereinafter called "the Contractor"). Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Contractor, we hereby irrevocably undertake to pay you any sum(s) not exceeding *[amount(s)*[2] *in figures and words]* upon receipt by us of your first demand in writing declaring the Contractor to be in default under the Contract, without cavil or argument, or your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

On the date of your issuing, to the Contractor, the Completion Certificate for the Products and/or Services, the value of this guarantee will be reduced to any sum(s) not exceeding *[amount(s)*[2] *in figures and words].* This remaining guarantee shall expire *[insert a date which is 90 days of the end of the Term]* from the date of the Completion Certificate, and any demand for payment under it must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458, except that subparagraph (ii) of Sub-article 20 (a) is hereby excluded.

____

[Signature(s)]

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[2] *The Bank shall insert the amount(s) specified and denominated in the PC in the currency of the Contract.*

2.2 Advance Payment Security Form (Bank Guarantee)

____
[Bank’s Name, and Address of Issuing Branch or Office]

Beneficiary: *[Name and Address of Employer]*

Date: *[date]*

ADVANCE PAYMENT GUARANTEE No.: *[Advance Payment Guarantee Number]*

We have been informed that on *[date of award]* you awarded Contract No. *[Contract number]* for *[title and/or brief description of the Contract]* (hereinafter called "the Contract") to *[complete name of Contractor]* (hereinafter called "the Contractor"). Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum of *[amount in numbers and words, for each currency of the advance payment]* is to be made to the Contractor against an advance payment guarantee.

At the request of the Contractor, we hereby irrevocably undertake to pay you any sum or sums not exceeding in total the amount of the advance payment referred to above, upon receipt by us of your first demand in writing declaring that the Contractor is in breach of its obligations under the Contract because the Contractor used the advance payment for purposes other than toward the proper execution of the Contract.

It is a condition for any claim and payment to be made under this guarantee that the advance payment referred to above must have been received byte Contractor on its account *[number and domicile of the account].*

For each payment after the advance payment, which you will make tithe Contractor under this Contract, the maximum amount of this guarantee shall be reduced in accordance with the following percentage reduction table:

[insert table from PC Sub-Clause 6.1]

At the time at which the amount guaranteed becomes nil, this guarantee shall become null and void, whether the original is returned to us or not.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458.

____

[Signature(s)]

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* To be added by the Employer over and above the bid price which is exclusive of the GST

3 Completion Certificate

3.1 Completion Certificate

Date: [*date*]
Loan/Credit Number: [*loan or credit number from IFB*]
IFB: [*title and number of IFB*]
Contract: [*name of Products and/or Services and number of Contract*]

To: [*name and address of Contractor*]

Dear Sir or Madam:

Pursuant to GC Clause 25 (Completion of Installation and Works) of the Contract entered into between yourselves and the *[name of Employer]* (hereinafter the "Employer") dated *[date of Contract],* relating to the *[brief description of the Products and/or Services],* we hereby notify you the Works (or relevant part thereof identified below) have been completed in accordance with the Contract, all Documentation has been supplied, and that the Works (or relevant part thereof) are ready for operation.

1. Description of the Works: *[description*]
2. Date of Completion: *[date]*

This letter shall not relieve you of your remaining performance obligations under the Contract nor of your obligations during the Warranty Period.

For and on behalf of the *Employer*

Signed:

Date:

in the capacity of: [state: *"Project Manager" or higher level authority in the Employer's organization]*

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* To be added by the Employer over and above the bid price which is exclusive of the GST

4 Change Order Procedures and Forms

Date: *[date]*
Loan/Credit Number: [*loan or credit number from IFB*]
IFB: [*title and number of IFB*]
Contract: [*name of Products and/or Services and number of Contract]*

General

This section provides samples of procedures and forms for carrying out changes to the Works and/or Services during the performance of the Contract in accordance with GC Clause 41 (Change in the Works and/or Services) of the Contract.

Change Order Log

The Contractor shall keep an up-to-date Change Order Log to show the current status of Requests for Change and Change Orders authorized or pending. Changes shall be entered regularly in the Change Order Log to ensure that the log is kept up-to-date. The Contractor shall attach a copy of the current Change Order Log in the monthly progress report to be submitted to the Employer.

References to Changes

(1) Request for Change Proposals (including Application for Change Proposals) shall be serially numbered CR-nnn.
(2) Change Estimate Proposals shall be numbered CN-nnn.
(3) Estimate Acceptances shall be numbered CA-nnn.
(4) Change Proposals shall be numbered CP-nnn.
(5) Change Orders shall be numbered CO-nnn.

On all forms, the numbering shall be determined by the original CR-nnn.

Annexes

4.1 Request for Change Proposal Form
4.2 Change Estimate Proposal Form
4.3 Estimate Acceptance Form
4.4 Change Proposal Form
4.5 Change Order Form
4.6 Application for Change Proposal Form

4.1 Request for Change Proposal Form (Employer)

(Employer's Letterhead)

Date: [*date*]
Loan/Credit Number: [*loan or credit number from IFB*]
IFB: *[title and number of IFB]*
Contract: *[name of Products and/or Services or number of Contract]*

To: *[name of Contractor and address]*
Attention: *[name and title]*

Dear Sir or Madam:

With reference to the above-referenced Contract, you are requested to prepare and submit a Change Proposal for the Change noted below in accordance with the following instructions within *[number]* days of the date of this letter.

1. Title of Change: *[title]*

2. Request for Change No./Rev.: *[number]*

3. Originator of Change: *[select Employer /Contractor (by Application for Change Proposal), and add: name of originator]*

4. Brief Description of Change: *[description]*

5. Works or Services affected by requested Change): *[description]*

6. Technical documents and/or drawings for the request of Change:

   Document or Drawing No. Description

7. Detailed conditions or special requirements of the requested Change: *[description]*

8. Procedures to be followed:
   (a) Your Change Proposal will have to show what effect the requested Change will have on the Contract Price.
   (b) Your Change Proposal shall explain the time it will take to complete the requested Change and the impact, if any, it will have on the date Time for Completion.
   (c) If you believe implementation of the requested Change will have a negative impact on the quality, operability, or integrity of the Works and/or Services, please provide a detailed

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* To be added by the Employer over and above the bid price which is exclusive of the GST

explanation, including other approaches that might achieve the same impact as the requested Change.

(d) You should also indicate what impact the Change will have on the number and mix of staff needed by the Contractor to perform the Contract.

(e) You shall not proceed with the execution of work related to the requested Change until we have accepted and confirmed the impact it will have on the Contract Price and the Implementation Schedule in writing.

9. As a next step, please respond using the Change Estimate Proposal form, indicating how much it will cost you to prepare a concrete Change Proposal that will describe the proposed approach for implementing the Change, all its elements, and will also address the points in paragraph 8 above pursuant to GC Clause 41. Your Change Estimate Proposal should contain a first approximation of the proposed approach, and implications for schedule and cost, of the Change.

For and on behalf of the *Employer*

Signed:

Date:

in the capacity of: *[state: “Project Manager” or higher level authority in the Employer’s organization]*

4.2 Change Estimate Proposal Form (Contractor)

(Contractor's Letterhead)

Date: *[date]*
Loan/Credit Number: *[loan or credit number from IFB]*
IFB: *[title and number of IFB]*
Contract: *[name of Products and/or Services and number of Contract]*

To: *[name of Employer and address***]**

Attention: *[name and title]*

Dear Sir or Madam:

With reference to your Request for Change Proposal, we are pleased to notify you of the approximate cost of preparing the below-referenced Change in accordance with GC Clause 41 of the Contract. We acknowledge that your agreement to the cost of preparing the Change Proposal, in accordance with GC Clause 41, is required before we proceed to prepare the actual Change Proposal including a detailed estimate of the cost of implementing the Change itself.

1. Title of Change*: [title]*
2. Request for Change No./Rev.: *[number]*
3. Brief Description of Change (including proposed implementation approach): *[description]*
4. Schedule Impact of Change (initial estimate): *[description]*
5. Initial Cost Estimate for Implementing the Change: *[initial cost estimate]*
6. Cost for Preparation of Change Proposal: *[cost in the currencies of the Contract],* as detailed below in the breakdown of prices, rates, and quantities.

For and on behalf of the Contractor

Signed:

Date:

in the capacity of: *[*state*: "Contractor's Representative" or other higher level authority in the Contractor's organization]*

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* To be added by the Employer over and above the bid price which is exclusive of the GST

4.3 Estimate Acceptance Form (Employer)

(Employer’s Letterhead)

Date: *[date]*
Loan/Credit Number: *[loan or credit number from IFB]*
IFB: *[title and number of IFB]*
Contract: *[name of Products and/or Services and number of Contract]*

To: *[name of Contractor and address]*

Attention: *[name and title]*

Dear Sir or Madam:

We hereby accept your Change Estimate and agree that you should proceed with the preparation of a formal Change Proposal.

1. Title of Change: *[title]*
2. Request for Change No./Rev.: *[request number / revision]*
3. Change Estimate Proposal No./Rev.: *[proposal number / revision]*
4. Estimate Acceptance No./Rev.: *[estimate number / revision]*
5. Brief Description of Change: *[description]*
6. Other Terms and Conditions:

   In the event that we decide not to order the Change referenced above, you shall be entitled to compensation for the cost of preparing the Change Proposal up to the amount estimated for this purpose in the Change Estimate Proposal, in accordance with GC Clause 41 of the General Conditions of Contract.

For and on behalf of the *Employer*

Signed:
Date:
in the capacity of: *[state: “Project Manager” or higher level authority in the Employer’s organization]*

4.4 Change Proposal Form (Contractor)

(Contractor's Letterhead)

Date: *[date]*
Loan/Credit Number: *[loan or credit number from IFB]*
IFB: *[title and number of IFB]*
Contract: *[name of Products and/or Services and number of Contract]*

To: *[name of Employer and address***]**

Attention: *[name and title***]**

Dear Sir or Madam:

In response to your Request for Change Proposal No. *[: number],* we hereby submit our proposal as follows:

1. Title of Change: *[name]*

2. Change Proposal No./Rev.: *[proposal number/revision]*

3. Originator of Change: *[select: Employer /Contractor; and add: name]*

4. Brief Description of Change: *[description]*

5. Reasons for Change: *[reason]*

6. Works or Services that will be affected by the requested Change: *[description]*

7. Technical documents and/or drawings for the requested Change:

   Document or Drawing No. Description

8. Estimate of the increase/decrease to the Contract Price resulting from the proposed Change: *[amount in currencies of Contract],* as detailed below in the breakdown of prices, rates, and quantities.

   Total lump sum cost of the Change:

   Cost to prepare this Change Proposal:

9. Additional Time for Completion required due to the Change: *[amount in days / weeks]*

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* To be added by the Employer over and above the bid price which is exclusive of the GST

10. Effect on the other terms and conditions of the Contract: *[description]*

11. Validity of this Proposal: for a period of *[number]* days after receipt of this Proposal by the Employer

12. Procedures to be followed:
    - (a) You are requested to notify us of your acceptance, comments, or rejection of this detailed Change Proposal within *[number]* days from your receipt of this Proposal.
    - (b) The amount of any increase and/or decrease shall be taken into account in the adjustment of the Contract Price.

For and on behalf of the Contractor

Signed:

Date:

in the capacity of: *[state: "Contractor's Representative" or other higher level authority in the Contractor's organization]*

4.5 Change Order Form (Employer)

(*Employer*'s Letterhead)

Date: *[date]*
Loan/Credit Number: *[loan or credit number from IFB]*
IFB: *[title and number of IFB]*
Contract: *[name of Products and/or Services and number of Contract]*

To: *[name of Contractor and address]*

Attention: *[name and title]*

Dear Sir or Madam:

We hereby approve the Change Order for the work specified in Change Proposal No. *[number]*, and agree to adjust the Contract Price, Time for Completion, and/or other conditions of the Contract in accordance with GC Clause 41 of the Contract.

1. Title of Change: *[name]*

2. Request for Change No./Rev.: *[request number / revision]*

3. Change Order No./Rev.: *[order number / revision]*

4. Originator of Change: *[select: Employer /Contractor; and add: name]*

5. Authorized Price for the Change:

   Ref. No.: *[numbe**r**]* Date: *[dat**e**]*

   [amount in foreign currency A] plus *[amount in foreign currency B]* plus *[: amount in foreign currency C]* plus *[amount in local currency]*

6. Adjustment of Time for Completion: *[amount and description of adjustment]*

7. Other effects, if any: *[state: "none" or description]*

For and on behalf of the Employer
Signed:
Date:
in the capacity of: *[state: "Project Manager" or higher level authority in the Employer's organization]*

---

* To be added by the Employer over and above the bid price which is exclusive of the GST

For and on behalf of the Contractor

Signed:

Date:

in the capacity of: *[state “Contractor’s Representative” or higher level authority in the Contractor’s organization\ ]*

4.6 Application for Change Proposal Form (Contractor)

(Contractor's Letterhead)

Date: *[date]*
Loan/Credit Number: *[loan or credit number from IFB]*
IFB: *[title and number of IFB]*
Contract: *[name of Products and/or Services and number of Contract]*

To: *[name of Employer and address]*

Attention: *[name and title]*

Dear Sir or Madam:

We hereby propose that the below-mentioned work be treated as a Change to the Works and/or Services.

1. Title of Change: *[name]*

2. Application for Change Proposal No./Rev.: *[number / revision]* dated: *[date]*

3. Brief Description of Change: *[description]*

4. Reasons for Change: *[description]*

5. Order of Magnitude Estimation: *[amount in currencies of the Contract]*

6. Schedule Impact of Change: *[description]*

7. Appendix: *[titles (if any); otherwise state "none"]*

For and on behalf of the Contractor

Signed:

Date:

in the capacity of: *[state: "Contractor's Representative" or higher-level authority in the Contractor's organization]*

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* To be added by the Employer over and above the bid price which is exclusive of the GST

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUT 2.5 AND 5.5 - SET UP OF BRT OPERATING COMPANY

March 2020

LOGIT
REBEL
Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

The Bus Industry Restructuring Program was conceived progressively through RFP, consultations with Asian Development Bank, PIU and SMTA and detailed surveys conducted with industry stakeholder in the initial part.

It was understood that the inclusion of Bus Industry Stakeholders would be considered as,

1. Owners of operating companies of the new BRT system
2. Employees of the new BRT operating companies
3. Accepting compensations from Government and leave the industry

The first option, which is to encourage the existing operators for forming operating companies to operate new BRT system, need to have some pre-requisites/ pre-qualifications - without meeting which, the operator may not be eligible for applying to operate in the new environment.

The new BRT system is a state of the art, third generation BRT, which is expected to provide excellent services to public. The pre-requisites assessed include following,

1. Existing Operators are organized in a structure of companies/ organizations
2. Existing operators have adequate capacity and technical acumen to operate complex BRT operations
3. Existing operators have any experience in operating such companies/ running similar operations
4. Existing operators show positive attitude or better future prospects for the BRT operations
5. Existing operators have financial strength or willingness to participate as operating companies

Based on the initial study of the bus industry in Karachi, the individual survey conducted with all the stakeholders and the consultations with associations; it was concluded that none of the pre-requisites were met by the existing operators.

Based on these findings, PIU, SMTA and Asian Development Bank considered to have no option for existing operators to be negotiated for forming BRT operating companies thus it was decided to re-visit the strategy and initiate a competitive bidding process for hiring experienced Vehicle Operating Companies who had demonstrated skills of running similar operations. Therefore, tasks related to formalizing operating companies by the existing operators were not required.

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUT 4.3 - YELLOW LINE - FINANCIAL MODELLING OF FUTURE BRT OPERATIONS

May 2019

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

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1. Introduction

Interim Report 2 Final: Appendix C – Yellow Line: Financial Modelling is divided in seven chapters that assist the reader to better understand how the model was elaborated and how it works. The chapters are as following:

1. Introduction
2. Current Status of the Financial Model
3. Purpose of the Financial Model
4. Function of the Financial Model and Dashboard
5. Structure and Contents of the Financial Model
6. Costs, Revenues and Results of the Financial Model
7. Annex A – Yellow Line Revenues and OPEX Summary

Chapter 2 summarizes the factors that were taken into account when creating the model and the functional areas encompassed by it, while Chapter 3 informs the reader about the degree to which the system costs and revenues 'balance' and the appropriate levels of service provider revenues at which the entities can cover their costs and achieve the target cash flow margin.

The model dashboard, evaluated scenarios, optimization process comprised by the model and the various factors that drive the cash flows of the service providers is explained in Function of the Financial Model and Dashboard. Chapter 5 details the structure of the model and the principles and characteristics of the methodology used, and the last chapter describes all the operational cost, revenues and financial results of the model. Finally, Annex A summarizes the breakdown of the revenues and costs of the financial model for each of the evaluated scenarios.

2. Current Status of the Financial Model

The financial model built is to help support decision making on the service offering and business planning of the Karachi BRT Project. The model takes into account all capital costs, operating costs and revenues relevant to the establishment and implementation of the envisaged BRT service.

The current model version encompasses projections for the following 'functional' areas:

- BRT vehicle operations;
- Automated fare collection supply, installation and operation;
- Intelligent Transport System (ITS) supply, installation and operation;
- Station furnishing and management;
- Fund management of fare revenue funds collected; and
- Operating overheads of TransKarachi

The current status of the model is version 01r. It is complete based on the information made available to us. This is a working version of the model, which will be used actively in optimisation of the service and business planning aspects of the ODBM scope. The model was refined from the original version to:

1) align costs within the local context of the project;
2) align AFC and ITS capital costs with the operational parameters; and
3) include additional fare structure scenarios and operational (bus types and configurations) scenarios.

The Karachi BRT Project financial model can be found in Appendix A.1 – Financial Model.

3. Purpose of the Financial Model

The purpose of the financial model is two-fold:

- To inform the degree to which the system costs and revenues 'balance'. The model provides an outlook on the full system fare revenue collected, and if it is sufficient enough to cover the operational costs related to the BRT Vehicle Operating Company, System Control Service Provider and TransKarachi.
- To inform the appropriate levels of service provider revenues at which the entities can cover their costs and achieve the target cash flow margin. The model provides the required bus-kilometre charges for the BRT Vehicle Operating Company and the availability payments for the System Control Service Provider.

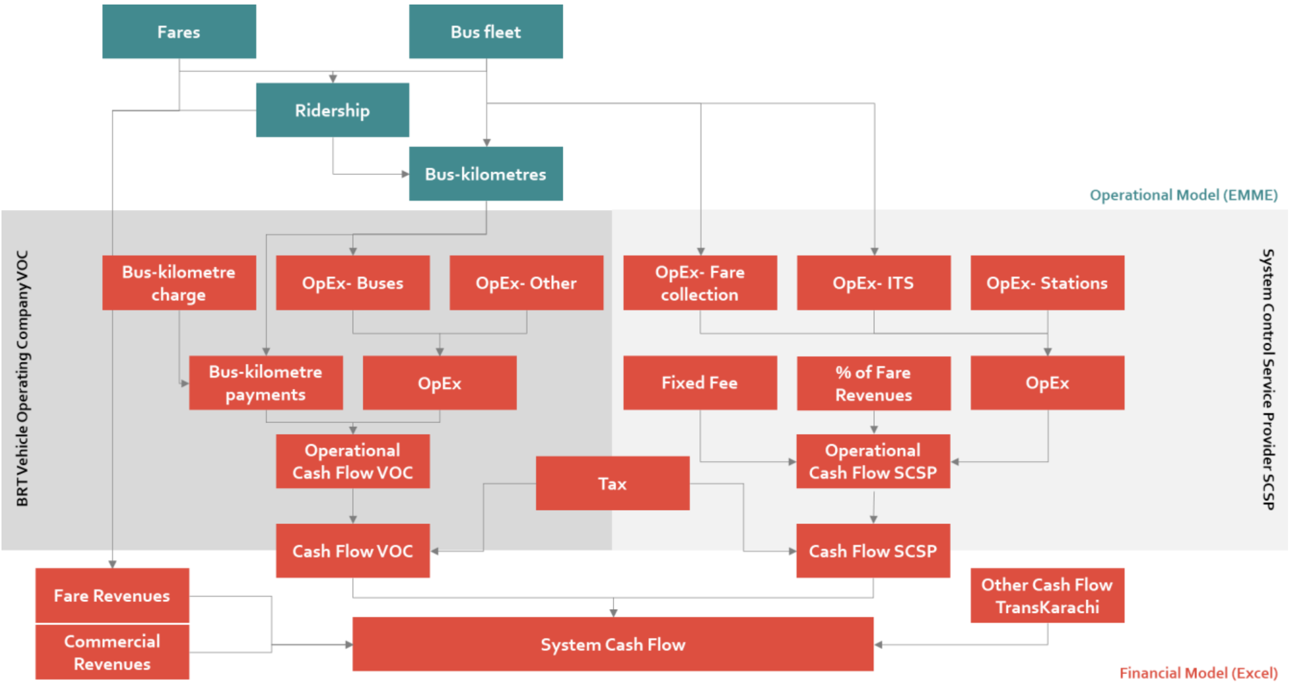
This purpose has specific relevance to tender proceedings wherein the procuring authority needs to make sense of pricing by bidders – either before bid submission (e.g. by setting minimum or maximum prices, even if not communicated to bidders) or after bid submission (e.g. in order to assess whether pricing submitted by bidders can be considered adequate to qualify as 'realistic' business planning).

The structure of relevant entities has been based on the business model report and includes:

- BRT Vehicle Operating Company (VOC): The VOC is responsible for the operation and management of the buses. For modelling purposes, the VOC has been treated as a single entity. There are 2 financing scenarios included in the model: (1) capital expenditures borne by the VOC and (2) capital expenditures borne directly by the entity, as it is presumed to be covered separately from ADB-financed milestone payments
- System Control Service Provider (SCSP): The System Control Service Provider is a single operator providing equipment and services for automated fare collection, ITS and station management. Capital expenditures related to the services are borne by the operator.
- TransKarachi and Fund Manager: Overhead costs related to TransKarachi's organisational expenses including presumed fund management costs (i.e. fees charged by a financial institution for management of the fare revenue electronic money "float account").

4. Function of the Financial Model and Dashboard

The figure below depicts the various factors that drive the cash flows of the service providers. The financial model has been tested with the operational model and has been optimised accordingly.



The arithmetic functioning of the model reflects the above described model purpose and logic. For every entity, it calculates costs, and therefrom it determines the revenues needed to cover those costs and earn a return on capital invested and risk incurred.

This is done through an optimisation routine which comprises of the following consecutive functions:

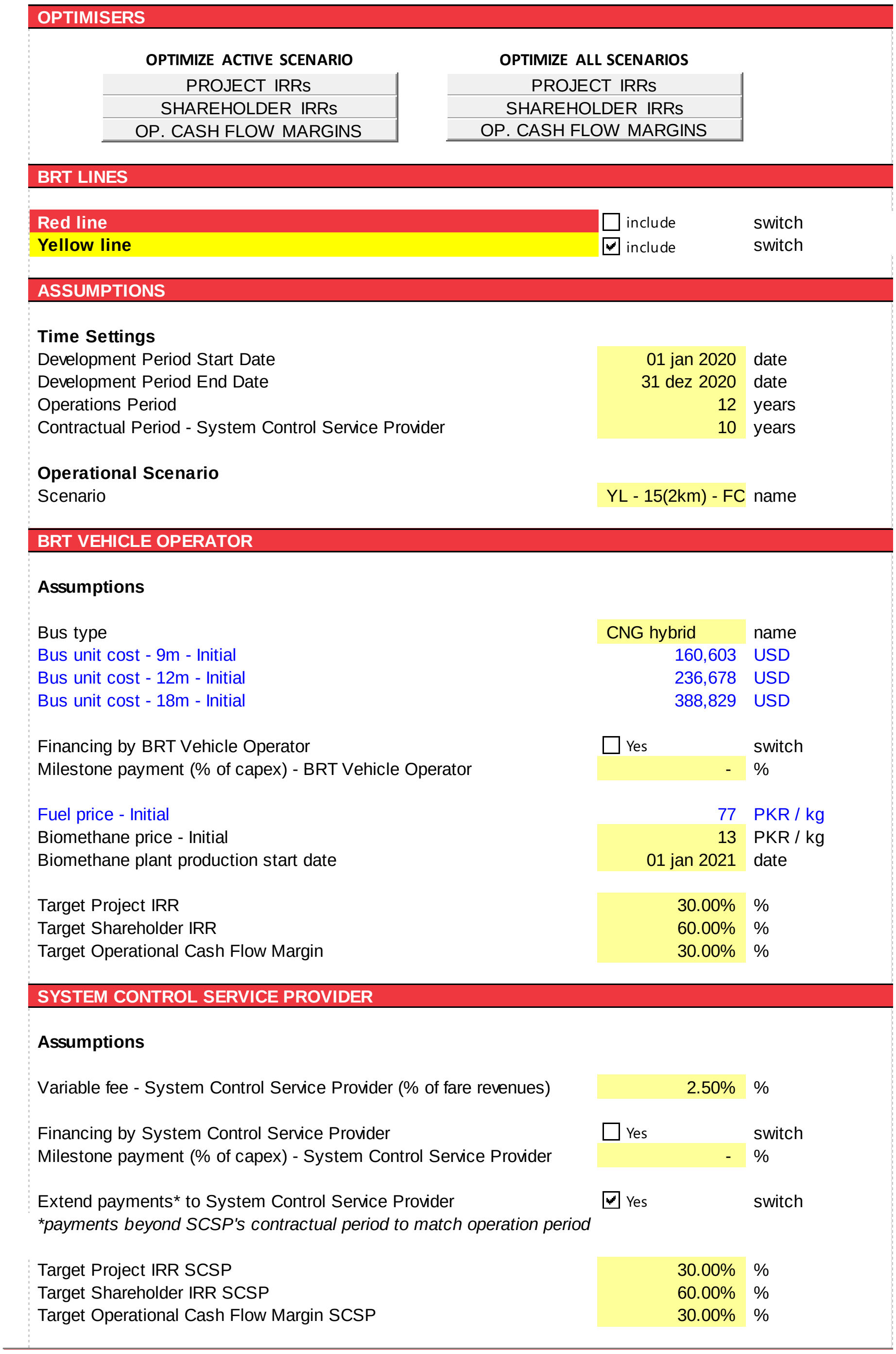
- Optimisation of the business case of VOC 9m-bus service: determines a kilometre-based fee for 9m-bus vehicle operations such that the operational costs are covered and the target operational cash flow margin is achieved.
- Optimisation of the business case of VOC 12m-bus service: determines a kilometre-based fee for 12m-bus vehicle operations such that the operational costs are covered and the target operational cash flow margin is achieved.
- Optimisation of the business case of VOC 18m-bus service: determines a kilometre-based fee for 18m-bus vehicle operations such that the operational costs are covered and the target operational cash flow margin is achieved.
- Optimisation of fixed-cost business case of SCSP: determines a fixed periodic service payment based on the variable service payment input such that the SCSP's fixed costs are covered by those fixed payments received by it.

The optimisation routine is triggered by the optimisation button included in the model dashboard. The optimisation can be done for the active operating scenario and for all operational scenarios. Subsequent to running this optimisation routine, the model dashboard displays the resulting fees and the financial balance of the overall system as a function of the level of fare revenue generated, service provider payments projected and TransKarachi running costs projected.

The model dashboard as illustrated below, in the current base case, displays the following salient outcomes:

- First year of service fare revenue collected;
- First year of service commercial revenue projections on stations;
- First year of service VOC bus-kilometre payments;

- First year of service SCSP payments;
- First year of service fund management payments;
- First year of service TransKarachi running costs
- First year of service ‘balance’ of system cash flows; and
- TransKarachi’s net operating cash flow for the entire operational period.



BRT LINES

Red line	☐ include	switch
Yellow line	☑ include	switch

ASSUMPTIONS

Time Settings

Development Period Start Date	01 jan 2020	date
Development Period End Date	31 dez 2020	date
Operations Period	12	years
Contractual Period - System Control Service Provider	10	years

Operational Scenario

Scenario	YL - 15(2km) - FC	name

BRT VEHICLE OPERATOR

Assumptions

Bus type	CNG hybrid	name
Bus unit cost - 9m - Initial	160,603	USD
Bus unit cost - 12m - Initial	236,678	USD
Bus unit cost - 18m - Initial	388,829	USD
Financing by BRT Vehicle Operator	☐ Yes	switch
Milestone payment (% of capex) - BRT Vehicle Operator	-	%
Fuel price - Initial	77	PKR / kg
Biomethane price - Initial	13	PKR / kg
Biomethane plant production start date	01 jan 2021	date
Target Project IRR	30.00%	%
Target Shareholder IRR	60.00%	%
Target Operational Cash Flow Margin	30.00%	%

SYSTEM CONTROL SERVICE PROVIDER

Assumptions

Variable fee - System Control Service Provider (% of fare revenues)	2.50%	%
Financing by System Control Service Provider	☐ Yes	switch
Milestone payment (% of capex) - System Control Service Provider	-	%
Extend payments* to System Control Service Provider *payments beyond SCSP's contractual period to match operation period*	☑ Yes	switch
Target Project IRR SCSP	30.00%	%
Target Shareholder IRR SCSP	60.00%	%
Target Operational Cash Flow Margin SCSP	30.00%	%

The dashboard section preceding model outcomes displays the BRT operational scenarios, described below. These are based on the transport modelling in terms of passengers per day, fleet requirements and vehicle-kilometres per day.

For the financial model, there were six different scenarios evaluated based on combinations of different premises for:

- Route plan

  Several route plans were evaluated during the decision making process, and the one presented in Interim Report 2 - Appendix D, is a result of the optimization process.

- Fare Structure (FS)

  Higher and lower fare structures were evaluated for a better understanding of the population behaviour when facing different BRT costs

- Fleet composition (FC)

  The analysis considered 9m, 12m and 18m buses to be used in the different services for the Yellow Line, and the combinations presented in this report are the result of this process

All the premises above are explained in detail in the Appendix D (Output 4.4) of Interim Report 2. The following table summarizes the premises for each of the evaluated scenarios.

Table 4.1: Evaluated Scenarios

Scenario	Fare Structure	Fleet Composition
YL - 15(2km) - FC 1	15-55 PKR with 5 PKR increment every 2km	Trunk Services: 18 m Direct Services: 12m Feeder Services: 9m
YL - 15(2km) - FC 2	15-55 PKR with 5 PKR increment every 2km	Trunk Services: 18 m Direct Services: 12m
YL - 10(5km) - FC 1	10-40 PKR with 5 PKR increment every 5km	Trunk Services: 18 m Direct Services: 12m Feeder Services: 9m
YL - 10(5km) - FC 2	10-40 PKR with 5 PKR increment every 5km	Trunk Services: 18 m Direct Services: 12m
YL - 20(5km) - FC 1	20-50 PKR with 5 PKR increment every 5km	Trunk Services: 18 m Direct Services: 12m Feeder Services: 9m
YL - 20(5km) - FC 2	20-50 PKR with 5 PKR increment every 5km	Trunk Services: 18 m Direct Services: 12m

OPERATIONAL SCENARIOS

Operational scenario	ACTIVE		YL - 15(2km) - FC 1	YL - 15(2km) - FC 2	YL - 10(5km) - FC 1	YL - 10(5km) - FC 2	YL - 20(5km) - FC 1	YL - 20(5km) - FC 2
Annual fare revenues	3,021	PKR million	3,021	3,021	2,298	2,298	2,798	2,798
Daily ridership - Red Line Operator 1	-	pax	-	-	-	-	-	-
Daily ridership - Red Line Operator 2	-	pax	-	-	-	-	-	-
Daily ridership - Yellow Line Operator 1	531,686	pax	531,686	531,686	802,973	802,973	640,395	640,395
Daily ridership - Yellow Line Operator 2	-	pax	-	-	-	-	-	-
Operational fleet - 9m buses - Red Line Operator 1	-	buses	-	-	-	-	-	-
Operational fleet - 9m buses - Red Line Operator 2	-	buses	-	-	-	-	-	-
Operational fleet - 12m buses - Red Line Operator 1	-	buses	-	-	-	-	-	-
Operational fleet - 12m buses - Red Line Operator 2	-	buses	-	-	-	-	-	-
Operational fleet - 18m buses - Red Line Operator 1	-	buses	-	-	-	-	-	-
Operational fleet - 18m buses - Red Line Operator 2	-	buses	-	-	-	-	-	-
Operational fleet - 9m buses - Yellow Line Operator 1	68	buses	68	-	96	-	85	-
Operational fleet - 9m buses - Yellow Line Operator 2	-	buses	-	-	-	-	-	-
Operational fleet - 12m buses - Yellow Line Operator 1	118	buses	118	165	162	226	129	187
Operational fleet - 12m buses - Yellow Line Operator 2	-	buses	-	-	-	-	-	-
Operational fleet - 18m buses - Yellow Line Operator 1	83	buses	83	83	121	121	105	105
Operational fleet - 18m buses - Yellow Line Operator 2	-	buses	-	-	-	-	-	-
Bus-kms - 9m buses - Red Line Operator 1	-	bus-kms	-	-	-	-	-	-
Bus-kms - 9m buses - Red Line Operator 2	-	bus-kms	-	-	-	-	-	-
Bus-kms - 12m buses - Red Line Operator 1	-	bus-kms	-	-	-	-	-	-
Bus-kms - 12m buses - Red Line Operator 2	-	bus-kms	-	-	-	-	-	-
Bus-kms - 18m buses - Red Line Operator 1	-	bus-kms	-	-	-	-	-	-
Bus-kms - 18m buses - Red Line Operator 2	-	bus-kms	-	-	-	-	-	-
Bus-kms - 9m buses - Yellow Line Operator 1	12,221	bus-kms	12,221	-	18,288	-	16,032	-
Bus-kms - 9m buses - Yellow Line Operator 2	-	bus-kms	-	-	-	-	-	-
Bus-kms - 12m buses - Yellow Line Operator 1	22,127	bus-kms	22,127	30,978	30,918	43,399	24,720	35,617
Bus-kms - 12m buses - Yellow Line Operator 2	-	bus-kms	-	-	-	-	-	-
Bus-kms - 18m buses - Yellow Line Operator 1	24,795	bus-kms	24,795	24,795	36,194	36,194	31,746	31,746
Bus-kms - 18m buses - Yellow Line Operator 2	-	bus-kms	-	-	-	-	-	-

TRANSKARACHI								
System Cash Flows in First Year of Operation (Nominal Values, 2021)								
Revenues - Fare revenues	2,870	PKR million	2,870	2,870	2,183	2,183	2,658	2,658
Revenues - Advertising on stations	487	PKR million	487	487	487	487	487	487
Revenues - Commercial activities on stations	140	PKR million	140	140	140	140	140	140
Revenue TransKarachi	3,497	PKR million	3,497	3,497	2,811	2,811	3,286	3,286
OpEx - Payments to BRT Vehicle Operator	(2,460)	PKR million	(2,460)	(2,335)	(3,475)	(3,260)	(2,969)	(2,792)
OpEx - Payments to System Control Service Provider	(1,330)	PKR million	(1,330)	(1,283)	(1,484)	(1,416)	(1,389)	(1,330)
OpEx - Payments to Fund Manager	(21)	PKR million	(21)	(21)	(21)	(21)	(21)	(21)
OpEx - TransKarachi Staff	(307)	PKR million	(307)	(307)	(307)	(307)	(307)	(307)
OpEx - TransKarachi Overheads	(66)	PKR million	(66)	(66)	(66)	(66)	(66)	(66)
Sales tax on services paid	(226)	PKR million	(226)	(218)	(252)	(241)	(236)	(226)
Net Operating Cash Flow TransKarachi	(913)	PKR million	(913)	(734)	(2,795)	(2,500)	(1,703)	(1,456)
Net Operating Cash Flows								
Net Operating Cash Flow TransKarachi 2021	(913)	PKR million	(913)	(734)	(2,795)	(2,500)	(1,703)	(1,456)
Net Operating Cash Flow TransKarachi 2022	(951)	PKR million	(951)	(763)	(2,927)	(2,618)	(1,781)	(1,521)
Net Operating Cash Flow TransKarachi 2023	(996)	PKR million	(996)	(799)	(3,072)	(2,746)	(1,868)	(1,595)
Net Operating Cash Flow TransKarachi 2024	(1,010)	PKR million	(1,010)	(802)	(3,189)	(2,848)	(1,925)	(1,639)
Net Operating Cash Flow TransKarachi 2025	(1,048)	PKR million	(1,048)	(830)	(3,336)	(2,978)	(2,009)	(1,708)
Net Operating Cash Flow TransKarachi 2026	(1,088)	PKR million	(1,088)	(859)	(3,491)	(3,114)	(2,097)	(1,781)
Net Operating Cash Flow TransKarachi 2027	(1,129)	PKR million	(1,129)	(889)	(3,652)	(3,256)	(2,189)	(1,857)
Net Operating Cash Flow TransKarachi 2028	(1,172)	PKR million	(1,172)	(919)	(3,821)	(3,405)	(2,284)	(1,936)
Net Operating Cash Flow TransKarachi 2029	(1,216)	PKR million	(1,216)	(950)	(3,997)	(3,561)	(2,384)	(2,018)
Net Operating Cash Flow TransKarachi 2030	(1,261)	PKR million	(1,261)	(982)	(4,182)	(3,723)	(2,488)	(2,104)
Net Operating Cash Flow TransKarachi 2031	(1,308)	PKR million	(1,308)	(1,016)	(4,375)	(3,894)	(2,596)	(2,193)
Net Operating Cash Flow TransKarachi 2032	(1,357)	PKR million	(1,357)	(1,050)	(4,577)	(4,072)	(2,710)	(2,286)
Milestone Payments								
Total Milestone Payment - BRT Vehicle Operator	-	PKR million	-	-	-	-	-	-
Total Milestone Payment - System Control Service Provider	-	PKR million	-	-	-	-	-	-
Total Milestone Payment	-	PKR million	-	-	-	-	-	-

BRT VEHICLE OPERATOR								
Remuneration								
Bus-kilometre charge (at operations start) - 9m buses	146	PKR	146	-	144	-	144	-
Bus-kilometre charge (at operations start) - 12m buses	152	PKR	152	153	149	150	149	152
Bus-kilometre charge (at operations start) - 18m buses	167	PKR	167	168	163	165	164	166
Financing Plan								
Total Equity Injection	-	PKR million	-	-	-	-	-	-
Total Drawdown - Milestone Bridge Facility	-	PKR million	-	-	-	-	-	-
Total Drawdown - Senior Debt Facility	-	PKR million	-	-	-	-	-	-
Total Sources	-	PKR million	-	-	-	-	-	-
Total CapEx - BRT Vehicle Operator POS	-	PKR million	-	-	-	-	-	-
Financial costs paid during development period POS	-	PKR million	-	-	-	-	-	-
Tax paid during development period POS	-	PKR million	-	-	-	-	-	-
Total Uses	-	PKR million	-	-	-	-	-	-
Financial Indicators								
Project IRR	na	%	na	na	na	na	na	na
Project NPV	na	PKR million	na	na	na	na	na	na
Shareholder IRR	na	%	na	na	na	na	na	na
Shareholder NPV	na	PKR million	na	na	na	na	na	na

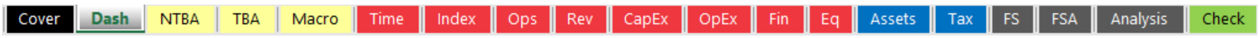
Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

SYSTEM CONTROL SERVICE PROVIDER								
Remuneration								
Fixed fee (at operations start)	105	PKR million	105	101	119	113	110	105
Financing Plan								
Total Equity Injection SCSP	-	PKR million	-	-	-	-	-	-
Total Drawdown - Milestone Bridge Facility SCSP	-	PKR million	-	-	-	-	-	-
Total Drawdown - Senior Debt Facility SCSP	-	PKR million	-	-	-	-	-	-
Total Sources	-	PKR million	-	-	-	-	-	-
Total CapEx - System Control Service Provider POS	-	PKR million	-	-	-	-	-	-
Financial costs paid during development period SCSP POS	-	PKR million	-	-	-	-	-	-
Tax paid during development period SCSP POS	-	PKR million	-	-	-	-	-	-
Total Uses	-	PKR million	-	-	-	-	-	-
Financial Indicators								
Project IRR SCSP	na	%	na	na	na	na	na	na
Project NPV SCSP	na	PKR million	na	na	na	na	na	na
Shareholder IRR SCSP	na	%	na	na	na	na	na	na
Shareholder NPV SCSP	na	PKR million	na	na	na	na	na	na

5. Structure and Contents of the Financial Model

5.1 Structure of the Financial Model

The structure of the model is as follows:`



- Cover: model cover sheet;
- Dash: dashboard with key inputs and operational scenarios for optimisation of operating fees;
- NTBA: Non-Time Based Assumptions, comprising all model assumptions which are not time-series;
- TBA: Time Based Assumptions, comprising all model assumptions which are time-series
- Macro: macro sheet that serves as a workaround to circular links in the model;
- Time: timing sheet for calculating all relevant model timelines;
- Index: indexation sheet for calculating all escalations, discount factors, etc. across time;
- Ops: operations calculating sheet, comprising all relevant quantities and volumes required to calculate revenues and costs from operations
- Rev: revenue calculation sheet calculating all revenues from fares and ancillary sources, as well as from calculated and optimised VOC and SCSP;
- Capex: capex calculation sheet calculating all capital expenditure aspects;
- Opex: opex calculation sheet calculating all operating expenditures for VOC, SCSP and TransKarachi;
- Fin: financing calculation sheet, comprising financing requirements of VOC and SCSP;
- Eq: equity calculation sheet calculating equity for VOC and SCSP;
- Assets: asset calculation sheet calculating all assets for VOC and SCSP
- Tax: all calculations pertaining to corporate income tax, federal tax and sales tax;
- FS: quarterly financial statements for VOC and SCSP, and cash flow statement for TransKarachi;
- FSA: annual financial statements for VOC and SCSP, and cash flow statement for TransKarachi;
- Analysis: analysis calculation sheet calculating financial performance indicators and ratios for VOC and SCSP; and
- Check: check on model integrity and robustness

5.2 Metodology of the Financial Model

A well-built financial model should be understandable to any government official or business person, regardless of their level of proficiency in Microsoft Excel. Furthermore, it is normally the case that financial models (1) must be built under short lead times, (2) must be readily adaptable as circumstances change over the course of the project and (3) must be built in a way that controls the risk of omissions and logical errors.

The FAST Standard (www.fast-standard.org) sets out both a set of design principles and consistent methodology for the construction of financial models that ensures all of these requirements are met.

Models built using the FAST Standard are:

- **Flexible**; allowing models to be adapted easily and quickly in case of availability of new/updated information;
- **Appropriate**; model design ensures that “form follows function” and the model delivers the business requirement;
- **Structured**; rigorous consistency in layout and organisation is essential to retain a model’s logical integrity over time, particularly as a model’s author may change; and
- **Transparent**; FAST is founded on simple, clear calculations that can be understood by other modellers and non-modellers alike.

Of these four principles, greatest emphasis is placed on transparency; a well-built financial model should be understandable to any person, regardless of their level of proficiency in Microsoft Excel. This unique emphasis is the key to reducing spreadsheet risk. Developed over many years, FAST is a ‘shared modelling language’ based on a series of ‘trade-mark’ characteristics that ensure transparency, efficient implementation, easy navigability and maintainability, high quality and robustness.

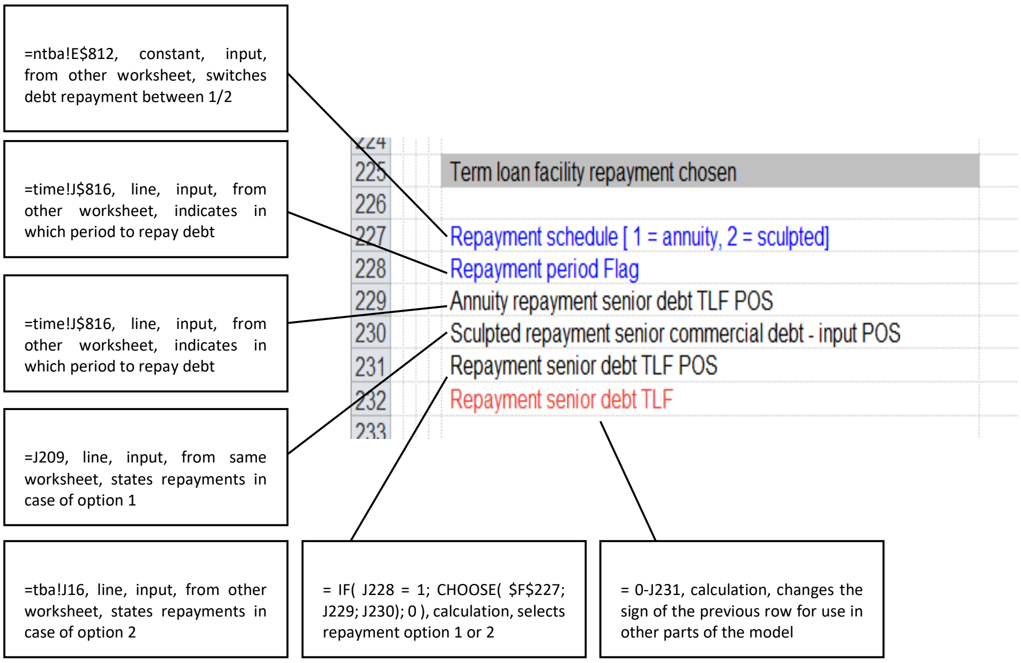
These characteristics include:

- **Complicated logic broken-down into small, simple pieces of logic**

Calculations in financial models should be straightforward and simple to follow: step, by step, by step. The occurrence of long formulas mean that the calculation should probably be broken down into constituent parts. As much as possible, formula length is limited to the so-called “rule of thumb”.

- **Each of the small pieces of logic is made up of ingredients, calculations and results**

This is essential. Every calculation is built up by (1) restating the inputs by calling them up from different sheets or from the same sheet, (2) carrying out the calculation and, when applicable, (3) stating the result of the calculation for use in the next calculation or for use in another worksheet.



=ntba!E$812, constant, input, from other worksheet, switches debt repayment between 1/2

=time!J$816, line, input, from other worksheet, indicates in which period to repay debt

=time!J$816, line, input, from other worksheet, indicates in which period to repay debt

=J209, line, input, from same worksheet, states repayments in case of option 1

=tba!J16, line, input, from other worksheet, states repayments in case of option 2

= IF(J228 = 1; CHOOSE($F$227; J229; J230); 0), calculation, selects repayment option 1 or 2

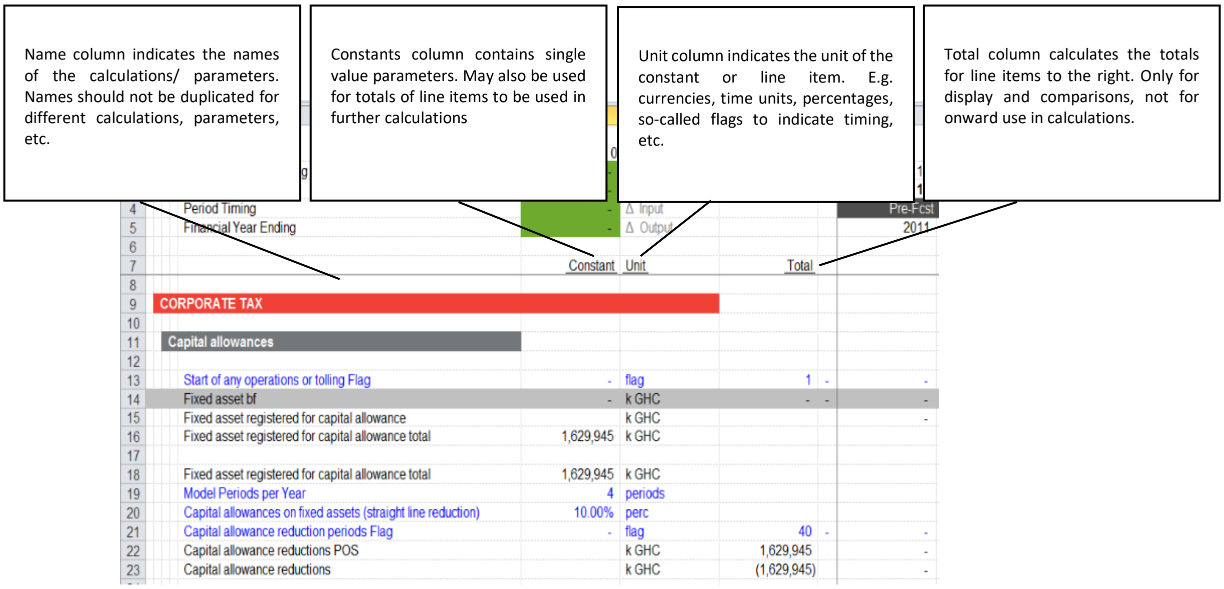
= 0-J231, calculation, changes the sign of the previous row for use in other parts of the model

225	Term loan facility repayment chosen
226	
227	Repayment schedule [1 = annuity, 2 = sculpted]
228	Repayment period Flag
229	Annuity repayment senior debt TLF POS
230	Sculpted repayment senior commercial debt - input POS
231	Repayment senior debt TLF POS
232	Repayment senior debt TLF
233	

The first cause of model problems is calculations of the value of the same item for each year across multiple columns, using different formulas to calculate the result. FAST prescribes formula consistency, meaning that each and every cell in a row of the model must have the same formula. Of course, to calculate interest in year X, you need the debt on balance in year X as input, and in year Y you need the debt on balance in year Y. However, the structure of the formula (e.g. = [debt on balance] * [interest rate percentage]) must not change.

- **Labels and units are part of each ingredient, each calculation and each result**

This is to say that i.e. each line item has the 3 properties, namely its name, unit and value. In addition, the model setup contains both constants, which are single figure items instead of line items, as well as item totals.



Name column indicates the names of the calculations/ parameters. Names should not be duplicated for different calculations, parameters, etc.

Constants column contains single value parameters. May also be used for totals of line items to be used in further calculations

Unit column indicates the unit of the constant or line item. E.g. currencies, time units, percentages, so-called flags to indicate timing, etc.

Total column calculates the totals for line items to the right. Only for display and comparisons, not for onward use in calculations.

4	Period Timing	-	Δ Input			Pre-Fcst
5	Financial Year Ending	-	Δ Output			2011
6						
7		Constant	Unit	Total		
8						
9	CORPORATE TAX					
10						
11	Capital allowances					
12						
13	Start of any operations or tolling Flag	-	flag	1	-	-
14	Fixed asset bf	-	k GHC	-	-	-
15	Fixed asset registered for capital allowance		k GHC			-
16	Fixed asset registered for capital allowance total	1,629,945	k GHC			
17						
18	Fixed asset registered for capital allowance total	1,629,945	k GHC			
19	Model Periods per Year	4	periods			
20	Capital allowances on fixed assets (straight line reduction)	10.00%	perc			
21	Capital allowance reduction periods Flag	-	flag	40	-	-
22	Capital allowance reductions POS		k GHC	1,629,945		-
23	Capital allowance reductions		k GHC	(1,629,945)		-

- **Limited number of Excel functions minimal use of range names and macros**

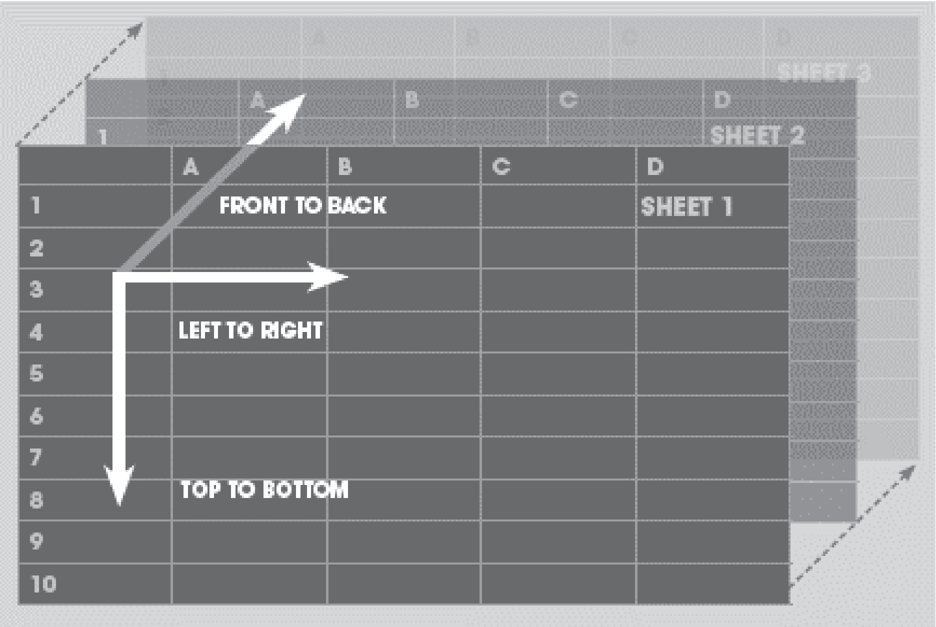
For FAST modelling, exotic Excel functions should be avoided and instead reproduced by their constituent calculations (e.g. even the Net Present Value should be calculated separately rather than using the Excel NPV function, which sometimes produces incorrect results).

Names (variables callable throughout the Excel workbook by reference to a global variable name instead of cell reference) and macros (Microsoft Visual Basic program code embedded in the Excel workbook and used to carry out specific actions on the model) are only used for model optimisation.

- **FAST models follow a logical and coherent flow from top to bottom and left to right**

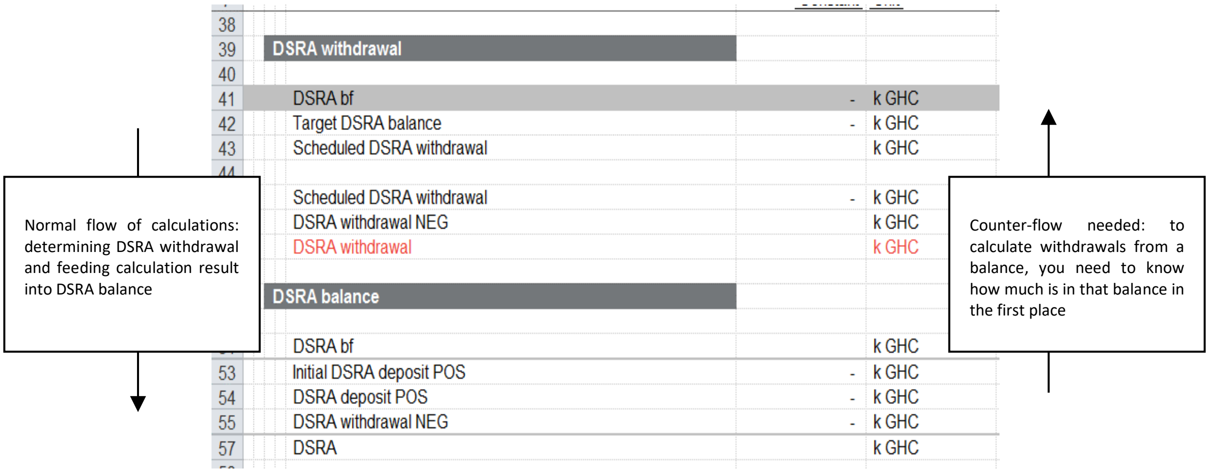
The same way we read, we develop FAST models.

Across the workbook, the worksheets containing hard-coded inputs come first, followed by calculation worksheets related to the project, followed by calculation worksheets related to the project cash flows, followed by calculation worksheets related to how to finance those project cash flows, followed by accounting calculation worksheets, followed by output sheets related to financial statements and other analyses.



Within the worksheet, calculations should only use inputs drawn from other previous worksheets or previous calculations on the same worksheet. As this is not possible in some cases, a so-called counter-flow is required.

This is indicated by a grey marking of the line item in question (not to be confused with single-column grey marking of headers).



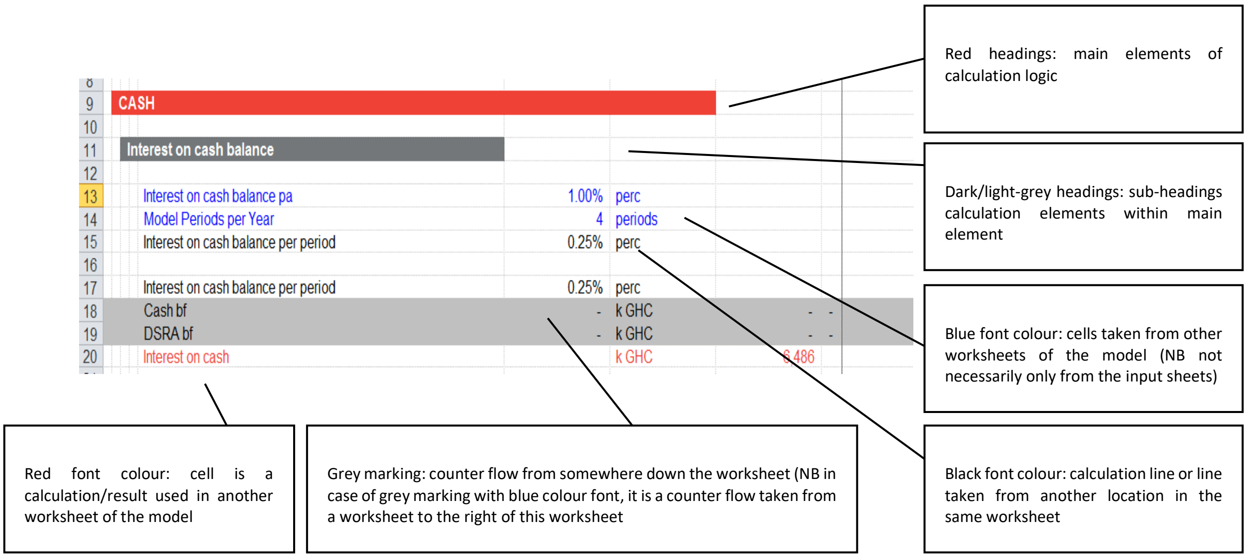
38			
39	DSRA withdrawal		
40			
41	DSRA bf	-	k GHC
42	Target DSRA balance	-	k GHC
43	Scheduled DSRA withdrawal		k GHC
	Scheduled DSRA withdrawal	-	k GHC
	DSRA withdrawal NEG		k GHC
	DSRA withdrawal		k GHC
	DSRA balance		
	DSRA bf		k GHC
53	Initial DSRA deposit POS	-	k GHC
54	DSRA deposit POS	-	k GHC
55	DSRA withdrawal NEG	-	k GHC
57	DSRA		k GHC

Normal flow of calculations: determining DSRA withdrawal and feeding calculation result into DSRA balance

Counter-flow needed: to calculate withdrawals from a balance, you need to know how much is in that balance in the first place

- **Simple visual colour coding**

Changing cell marking, line marking and font colours makes it easy to recognise the nature of different parts of the model.



9	CASH			
10				
11	Interest on cash balance			
12				
13	Interest on cash balance pa	1.00%	perc	
14	Model Periods per Year	4	periods	
15	Interest on cash balance per period	0.25%	perc	
16				
17	Interest on cash balance per period	0.25%	perc	
18	Cash bf	-	k GHC	- -
19	DSRA bf	-	k GHC	- -
20	Interest on cash		k GHC	6,486

Red headings: main elements of calculation logic

Dark/light-grey headings: sub-headings calculation elements within main element

Blue font colour: cells taken from other worksheets of the model (NB not necessarily only from the input sheets)

Black font colour: calculation line or line taken from another location in the same worksheet

Red font colour: cell is a calculation/result used in another worksheet of the model

Grey marking: counter flow from somewhere down the worksheet (NB in case of grey marking with blue colour font, it is a counter flow taken from a worksheet to the right of this worksheet

6. Costs, Revenues and Results of the Financial Model

6.1 Operational Costs of the Model

The following table outlines the various operational costs1 for the first operational year that would fall under the system under the different operational scenarios: Values are in PKR millions

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[1] The capital costs (which include bus fleet, AFC and ITS) were agreed to be separately funded and as such, do not fall under the scope of the VOC, SCSP, nor TransKarachi.

in PKR millions	*YL - FS 15(2km) - FC 1*	*YL - FS 15(2km) - FC 2*	*YL - FS 10(5km) - FC 1*	*YL - FS 10(5km) - FC 2*	*YL - FS 20(5km) - FC 1*	*YL - FS 20(5km) - FC 2*
VOC	(24,990)	(23,566)	(35,485)	(33,121)	(30,172)	(28,196)
Drivers	(4,921)	(4,532)	(6,909)	(6,333)	(5,834)	(5,329)
Mechanics	(382)	(350)	(537)	(492)	(453)	(414)
Schedulers	(249)	(218)	(342)	(311)	(280)	(264)
Management	(363)	(311)	(518)	(414)	(414)	(414)
Fuel	(1,452)	(1,494)	(2,093)	(2,138)	(1,780)	(1,818)
Electricity	-	-	-	-	-	-
Maintenance and parts	(15,594)	(14,706)	(22,518)	(20,986)	(19,115)	(17,762)
Office costs	(601)	(601)	(601)	(601)	(601)	(601)
Performance bond	(1,429)	(1,356)	(1,968)	(1,846)	(1,695)	(1,593)
SCSP	(9,005)	(8,691)	(10,048)	(9,588)	(9,410)	(9,005)
Conductors	(2,999)	(2,686)	(4,043)	(3,583)	(3,405)	(2,999)
Station staff	(4,257)	(4,257)	(4,257)	(4,257)	(4,257)	(4,257)
ITS and control centre staff	(737)	(737)	(737)	(737)	(737)	(737)
SCSP management staff	(205)	(205)	(205)	(205)	(205)	(205)
Station cleaning and maintenance	(285)	(285)	(285)	(285)	(285)	(285)
Station utilities and supplies	(285)	(285)	(285)	(285)	(285)	(285)

in PKR millions	*YL - FS 15(2km) - FC 1*	*YL - FS 15(2km) - FC 2*	*YL - FS 10(5km) - FC 1*	*YL - FS 10(5km) - FC 2*	*YL - FS 20(5km) - FC 1*	*YL - FS 20(5km) - FC 2*
SCSP office costs	(237)	(237)	(237)	(237)	(237)	(237)
TransKarachi	(5,825)	(5,825)	(5,825)	(5,825)	(5,825)	(5,825)
Permanent staff	(3,471)	(3,471)	(3,471)	(3,471)	(3,471)	(3,471)
Interim staff	(2)	(2)	(2)	(2)	(2)	(2)
Honorariums	(26)	(26)	(26)	(26)	(26)	(26)
PPIU staff	(1,065)	(1,065)	(1,065)	(1,065)	(1,065)	(1,065)
International advisor	(62)	(62)	(62)	(62)	(62)	(62)
Employee insurances	(172)	(172)	(172)	(172)	(172)	(172)
Office rent	(13)	(13)	(13)	(13)	(13)	(13)
Office renovation	(65)	(65)	(65)	(65)	(65)	(65)
Communication costs	(38)	(38)	(38)	(38)	(38)	(38)
Utilities	(80)	(80)	(80)	(80)	(80)	(80)
Transportation and generators	(109)	(109)	(109)	(109)	(109)	(109)
General expenses	(628)	(628)	(628)	(628)	(628)	(628)
Repair and maintenance	(95)	(95)	(95)	(95)	(95)	(95)

6.2 Revenues (including auxiliary revenues) of the Model

The following table outlines the various revenues for the first operational year under the different operational scenarios:

in PKR millions	*YL - FS 15(2km) - FC 1*	*YL - FS 15(2km) - FC 2*	*YL - FS 10(5km) - FC 1*	*YL - FS 10(5km) - FC 2*	*YL - FS 20(5km) - FC 1*	*YL - FS 20(5km) - FC 2*
Fare revenues	2,870	2,870	2,183	2,183	2,658	2,658
Advertising on stations	487	487	487	487	487	487
Commercial activities on stations	140	140	140	140	140	140

The financial model allocates the non-fare revenue to TransKarachi's revenue streams, except advertising on buses, whose revenue is allocated to VOC's revenue streams.

6.3 Financial Results of the Model

The following table outlines TransKarachi's net operating cash flow (Net OCF) results for the first operational year under the different operational scenarios:

in PKR millions	*YL - FS 15(2km) - FC 1*	*YL - FS 15(2km) - FC 2*	*YL - FS 10(5km) - FC 1*	*YL - FS 10(5km) - FC 2*	*YL - FS 20(5km) - FC 1*	*YL - FS 20(5km) - FC 2*
Net OCF 2021	(913)	(734)	(2,795)	(2,500)	(1,703)	(1,456)
Net OCF 2022	(951)	(763)	(2,927)	(2,618)	(1,781)	(1,521)
Net OCF 2023	(996)	(799)	(3,072)	(2,746)	(1,868)	(1,595)
Net OCF 2024	(1,010)	(802)	(3,189)	(2,848)	(1,925)	(1,639)
Net OCF 2025	(1,048)	(830)	(3,336)	(2,978)	(2,009)	(1,708)
Net OCF 2026	(1,088)	(859)	(3,491)	(3,114)	(2,097)	(1,781)
Net OCF 2027	(1,129)	(889)	(3,652)	(3,256)	(2,189)	(1,857)
Net OCF 2028	(1,172)	(919)	(3,821)	(3,405)	(2,284)	(1,936)
Net OCF 2029	(1,216)	(950)	(3,997)	(3,561)	(2,384)	(2,018)
Net OCF 2030	(1,261)	(982)	(4,182)	(3,723)	(2,488)	(2,104)
Net OCF 2031	(1,308)	(1,016)	(4,375)	(3,894)	(2,596)	(2,193)
Net OCF 2032	(1,357)	(1,050)	(4,577)	(4,072)	(2,710)	(2,286)

Annex A – Yellow Line Revenues and OPEX Summary

The breakdown of the revenues and costs of the financial model are presented in the following tables:

- Table 2: Yellow Line Revenues and OPEX Summary [in PKR millions] – FS 15 (2km) – FC1
- Table 3: Yellow Line Revenues and OPEX Summary [in PKR millions] – FS 15 (2km) – FC2
- Table 4: Yellow Line Revenues and OPEX Summary [in PKR millions] – FS 10 (5km) – FC1

- Table 5: Yellow Line Revenues and OPEX Summary [in PKR millions] – FS 10 (5km) – FC2
- Table 6: Yellow Line Revenues and OPEX Summary [in PKR millions] – FS 20 (5km) – FC1
- Table 7: Yellow Line Revenues and OPEX Summary [in PKR millions] – FS 20 (5km) – FC2

Note that the summary tables presented therein are an extract of the cost headings taken from the financial model, which do not exactly follow the breakdown presented in this comment. Furthermore, the version of the financial model submitted is already optimized and is intended for viewing to access the results and not be modified for re-optimization. The cost of utility bills is already included in the shared version of the financial model, under Station utilities and supplies.

a) The breakdown of the station manager costs is included in the summary tables under SCSP
b) Fund manager payments are estimated on the basis of a monthly charge payable for services provided, as is usually the case. The staffing and logistic details are not included in the financial model
c) Infrastructure maintenance costs are not within the scope of the PPP contract. The PPP contract limits the maintenance costs on the goods the private sector is providing (buses, stations, etc.)
d) The breakdown for generators, lifts, escalator maintenance and refueling costs are not included in the financial model. These costs are considered included under the station manager cleaning and maintenance costs, included in the summary tables under SCSP
e) The breakdown of the ITS operations is included in the summary tables under SCSP

Table 2: Yellow Line Revenues and OPEX Summary [in PKR millions] – FS 15 (2km) – FC1

	Total	Year 01	Year 02	Year 03	Year 04	Year 05	Year 06	Year 07	Year 08	Year 09	Year 10	Year 11	Year 12
REVENUES													
TransKarachi													
Fare revenues	45,679	2,870	3,013	3,164	3,322	3,488	3,663	3,846	4,038	4,240	4,452	4,675	4,908
Advertising on stations	7,749	487	511	537	564	592	621	652	685	719	755	793	833
Commercial activities on stations	2,234	140	147	155	162	171	179	188	198	207	218	229	240
TransKarachi Total	**55,662**	**3,497**	**3,672**	**3,855**	**4,048**	**4,251**	**4,463**	**4,686**	**4,921**	**5,167**	**5,425**	**5,696**	**5,981**
OPEX													
Vehicle Operating Company													
Staff	5,914	372	390	410	430	452	474	498	523	549	576	605	636
Fuel / electricity	1,452	91	96	101	106	111	116	122	128	135	141	149	156
Maintenance and spare parts	15,594	980	1,029	1,080	1,134	1,191	1,250	1,313	1,379	1,447	1,520	1,596	1,676
Overheads	2,029	108	110	148	150	163	165	178	181	196	198	215	218
Taxes	7,925	528	551	563	588	612	640	665	695	722	756	785	821
Profit margin (based on 30% OCF margin)	5,274	382	397	389	404	414	430	440	457	467	485	495	515
VOC Total	**38,189**	**2,460**	**2,572**	**2,690**	**2,813**	**2,941**	**3,075**	**3,216**	**3,363**	**3,516**	**3,677**	**3,845**	**4,021**
System Control Service Provider													
Conductors	2,999	238	250	263	276	290	304	320	336	352	370	-	-
Station staff	4,257	338	355	373	392	411	432	454	476	500	525	-	-
IT and control centre staff	737	59	62	65	68	71	75	79	82	87	91	-	-
Management staff	205	16	17	18	19	20	21	22	23	24	25	-	-
Station cleaning and maintenance	285	23	24	25	26	28	29	30	32	33	35	-	-
Station utilities and supplies	285	23	24	25	26	28	29	30	32	33	35	-	-
Office costs	237	19	20	21	22	23	24	25	27	28	29	-	-
Taxes	3,319	264	277	291	305	321	337	354	371	390	409	-	-
Profit margin (based on 30% OCF margin)	4,399	350	367	386	405	425	446	469	492	517	543	-	-
SCSP Total	**16,723**	**1,330**	**1,396**	**1,466**	**1,539**	**1,616**	**1,697**	**1,782**	**1,871**	**1,964**	**2,063**	**-**	**-**
TransKarachi													
Payments to VOC	38,189	2,460	2,572	2,690	2,813	2,941	3,075	3,216	3,363	3,516	3,677	3,845	4,021
Payments to SCSP	21,162	1,330	1,396	1,466	1,539	1,616	1,697	1,782	1,871	1,964	2,063	2,166	2,274
Payments to Fund Manager	338	21	22	23	25	26	27	28	30	31	33	35	36
Staff	4,797	307	325	351	346	363	381	400	420	441	463	487	511
Overheads	1,028	66	69	72	74	78	82	86	90	95	100	105	110
Taxes	3,598	226	237	249	262	275	288	303	318	334	351	368	387
TransKarachi Total	**69,112**	**4,410**	**4,623**	**4,852**	**5,058**	**5,299**	**5,551**	**5,815**	**6,092**	**6,382**	**6,686**	**7,005**	**7,338**

Table 3: Yellow Line Revenues and OPEX Summary [in PKR millions] – FS 15 (2km) – FC2

	Total	Year 01	Year 02	Year 03	Year 04	Year 05	Year 06	Year 07	Year 08	Year 09	Year 10	Year 11	Year 12
REVENUES													
TransKarachi													
Fare revenues	45,679	2,870	3,013	3,164	3,322	3,488	3,663	3,846	4,038	4,240	4,452	4,675	4,908
Advertising on stations	7,749	487	511	537	564	592	621	652	685	719	755	793	833
Commercial activities on stations	2,234	140	147	155	162	171	179	188	198	207	218	229	240
TransKarachi Total	**55,662**	**3,497**	**3,672**	**3,855**	**4,048**	**4,251**	**4,463**	**4,686**	**4,921**	**5,167**	**5,425**	**5,696**	**5,981**
OPEX													
Vehicle Operating Company													
Staff	5,410	340	357	375	393	413	434	456	478	502	527	554	581
Fuel / electricity	1,494	94	99	103	109	114	120	126	132	139	146	153	160
Maintenance and spare parts	14,706	924	970	1,019	1,070	1,123	1,179	1,238	1,300	1,365	1,433	1,505	1,580
Overheads	1,956	108	110	142	144	156	158	171	174	188	191	206	209
Taxes	7,474	498	520	532	556	578	604	627	656	681	712	739	773
Profit margin (based on 30% OCF margin)	5,153	372	386	381	396	405	421	430	447	456	474	484	502
VOC Total	**36,193**	**2,335**	**2,441**	**2,552**	**2,668**	**2,789**	**2,915**	**3,048**	**3,186**	**3,331**	**3,482**	**3,640**	**3,806**
System Control Service Provider													
Conductors	2,686	214	224	235	247	260	273	286	301	316	331	-	-
Station staff	4,257	338	355	373	392	411	432	454	476	500	525	-	-
IT and control centre staff	737	59	62	65	68	71	75	79	82	87	91	-	-
Management staff	205	16	17	18	19	20	21	22	23	24	25	-	-
Station cleaning and maintenance	285	23	24	25	26	28	29	30	32	33	35	-	-
Station utilities and supplies	285	23	24	25	26	28	29	30	32	33	35	-	-
Office costs	237	19	20	21	22	23	24	25	27	28	29	-	-
Taxes	3,203	255	267	281	295	310	325	341	358	376	395	-	-
Profit margin (based on 30% OCF margin)	4,246	338	354	372	391	410	431	452	475	499	524	-	-
SCSP Total	**16,141**	**1,283**	**1,347**	**1,415**	**1,486**	**1,560**	**1,638**	**1,720**	**1,806**	**1,896**	**1,991**	**-**	**-**
TransKarachi													
Payments to VOC	36,193	2,335	2,441	2,552	2,668	2,789	2,915	3,048	3,186	3,331	3,482	3,640	3,806
Payments to SCSP	20,427	1,283	1,347	1,415	1,486	1,560	1,638	1,720	1,806	1,896	1,991	2,090	2,195
Payments to Fund Manager	338	21	22	23	25	26	27	28	30	31	33	35	36
Staff	4,797	307	325	351	346	363	381	400	420	441	463	487	511
Overheads	1,028	66	69	72	74	78	82	86	90	95	100	105	110
Taxes	3,473	218	229	241	253	265	278	292	307	322	338	355	373
TransKarachi Total	**66,254**	**4,231**	**4,435**	**4,654**	**4,851**	**5,081**	**5,322**	**5,575**	**5,840**	**6,117**	**6,407**	**6,712**	**7,031**

Table 4: Yellow Line Revenues and OPEX Summary [in PKR millions] – FS 10 (5km) – FC1

	Total	Year 01	Year 02	Year 03	Year 04	Year 05	Year 06	Year 07	Year 08	Year 09	Year 10	Year 11	Year 12
REVENUES													
TransKarachi													
Fare revenues	34,755	2,183	2,293	2,407	2,528	2,654	2,787	2,926	3,072	3,226	3,387	3,557	3,734
Advertising on stations	7,749	487	511	537	564	592	621	652	685	719	755	793	833
Commercial activities on stations	2,234	140	147	155	162	171	179	188	198	207	218	229	240
TransKarachi Total	**44,738**	**2,811**	**2,951**	**3,099**	**3,254**	**3,416**	**3,587**	**3,767**	**3,955**	**4,153**	**4,360**	**4,578**	**4,807**
OPEX													
Vehicle Operating Company													
Staff	8,306	522	548	575	604	634	666	699	734	771	810	850	893
Fuel / electricity	2,093	132	138	145	152	160	168	176	185	194	204	214	225
Maintenance and spare parts	22,518	1,415	1,485	1,560	1,638	1,720	1,806	1,896	1,991	2,090	2,195	2,304	2,420
Overheads	2,568	108	110	192	194	211	213	232	234	255	257	280	283
Taxes	11,254	749	784	791	829	863	905	942	987	1,028	1,078	1,122	1,176
Profit margin (based on 30% OCF margin)	7,620	550	574	547	572	588	615	632	661	679	710	730	762
VOC Total	**54,359**	**3,475**	**3,639**	**3,810**	**3,989**	**4,176**	**4,372**	**4,577**	**4,792**	**5,018**	**5,253**	**5,500**	**5,758**
System Control Service Provider													
Conductors	4,043	321	338	354	372	391	410	431	452	475	499	-	-
Station staff	4,257	338	355	373	392	411	432	454	476	500	525	-	-
IT and control centre staff	737	59	62	65	68	71	75	79	82	87	91	-	-
Management staff	205	16	17	18	19	20	21	22	23	24	25	-	-
Station cleaning and maintenance	285	23	24	25	26	28	29	30	32	33	35	-	-
Station utilities and supplies	285	23	24	25	26	28	29	30	32	33	35	-	-
Office costs	237	19	20	21	22	23	24	25	27	28	29	-	-
Taxes	3,704	294	309	325	341	358	376	395	414	435	457	-	-
Profit margin (based on 30% OCF margin)	4,909	390	410	430	452	474	498	523	549	577	606	-	-
SCSP Total	**18,661**	**1,484**	**1,558**	**1,636**	**1,718**	**1,803**	**1,894**	**1,988**	**2,088**	**2,192**	**2,302**	**-**	**-**
TransKarachi													
Payments to VOC	54,359	3,475	3,639	3,810	3,989	4,176	4,372	4,577	4,792	5,018	5,253	5,500	5,758
Payments to SCSP	23,616	1,484	1,558	1,636	1,718	1,803	1,894	1,988	2,088	2,192	2,302	2,417	2,538
Payments to Fund Manager	338	21	22	23	25	26	27	28	30	31	33	35	36
Staff	4,797	307	325	351	346	363	381	400	420	441	463	487	511
Overheads	1,028	66	69	72	74	78	82	86	90	95	100	105	110
Taxes	4,015	252	265	278	292	307	322	338	355	373	391	411	431
TransKarachi Total	**88,152**	**5,605**	**5,879**	**6,170**	**6,443**	**6,753**	**7,078**	**7,419**	**7,776**	**8,150**	**8,542**	**8,953**	**9,384**

Table 5: Yellow Line Revenues and OPEX Summary [in PKR millions] – FS 10 (5km) – FC2

	Total	Year 01	Year 02	Year 03	Year 04	Year 05	Year 06	Year 07	Year 08	Year 09	Year 10	Year 11	Year 12
REVENUES													
TransKarachi													
Fare revenues	34,755	2,183	2,293	2,407	2,528	2,654	2,787	2,926	3,072	3,226	3,387	3,557	3,734
Advertising on stations	7,749	487	511	537	564	592	621	652	685	719	755	793	833
Commercial activities on stations	2,234	140	147	155	162	171	179	188	198	207	218	229	240
TransKarachi Total	**44,738**	**2,811**	**2,951**	**3,099**	**3,254**	**3,416**	**3,587**	**3,767**	**3,955**	**4,153**	**4,360**	**4,578**	**4,807**
OPEX													
Vehicle Operating Company													
Staff	7,550	474	498	523	549	577	605	636	667	701	736	773	811
Fuel / electricity	2,138	134	141	148	155	163	171	180	189	198	208	219	230
Maintenance and spare parts	20,986	1,318	1,384	1,454	1,526	1,603	1,683	1,767	1,855	1,948	2,045	2,148	2,255
Overheads	2,447	108	110	182	184	200	202	220	222	241	244	265	268
Taxes	10,504	699	732	739	775	806	845	880	922	959	1,005	1,046	1,096
Profit margin (based on 30% OCF margin)	7,300	526	548	526	549	565	590	607	633	651	680	698	729
VOC Total	**50,926**	**3,260**	**3,413**	**3,572**	**3,739**	**3,914**	**4,097**	**4,288**	**4,489**	**4,699**	**4,918**	**5,148**	**5,389**
System Control Service Provider													
Conductors	3,583	285	299	314	330	346	364	382	401	421	442	-	-
Station staff	4,257	338	355	373	392	411	432	454	476	500	525	-	-
IT and control centre staff	737	59	62	65	68	71	75	79	82	87	91	-	-
Management staff	205	16	17	18	19	20	21	22	23	24	25	-	-
Station cleaning and maintenance	285	23	24	25	26	28	29	30	32	33	35	-	-
Station utilities and supplies	285	23	24	25	26	28	29	30	32	33	35	-	-
Office costs	237	19	20	21	22	23	24	25	27	28	29	-	-
Taxes	3,534	281	295	310	325	342	359	377	395	415	436	-	-
Profit margin (based on 30% OCF margin)	4,684	372	391	411	431	453	475	499	524	550	578	-	-
SCSP Total	**17,806**	**1,416**	**1,486**	**1,561**	**1,639**	**1,721**	**1,807**	**1,897**	**1,992**	**2,092**	**2,196**	**-**	**-**
TransKarachi													
Payments to VOC	50,926	3,260	3,413	3,572	3,739	3,914	4,097	4,288	4,489	4,699	4,918	5,148	5,389
Payments to SCSP	22,533	1,416	1,486	1,561	1,639	1,721	1,807	1,897	1,992	2,092	2,196	2,306	2,421
Payments to Fund Manager	338	21	22	23	25	26	27	28	30	31	33	35	36
Staff	4,797	307	325	351	346	363	381	400	420	441	463	487	511
Overheads	1,028	66	69	72	74	78	82	86	90	95	100	105	110
Taxes	3,831	241	253	265	279	293	307	323	339	356	373	392	412
TransKarachi Total	**83,452**	**5,311**	**5,569**	**5,845**	**6,101**	**6,394**	**6,701**	**7,023**	**7,360**	**7,713**	**8,084**	**8,472**	**8,879**

Table 6: Yellow Line Revenues and OPEX Summary [in PKR millions] – FS 20 (5km) – FC1

_	Total	Year 01	Year 02	Year 03	Year 04	Year 05	Year 06	Year 07	Year 08	Year 09	Year 10	Year 11	Year 12
REVENUES													
TransKarachi													
Fare revenues	42,316	2,658	2,791	2,931	3,078	3,231	3,393	3,563	3,741	3,928	4,124	4,330	4,547
Advertising on stations	7,749	487	511	537	564	592	621	652	685	719	755	793	833
Commercial activities on stations	2,234	140	147	155	162	171	179	188	198	207	218	229	240
TransKarachi Total	**52,299**	**3,286**	**3,450**	**3,622**	**3,804**	**3,994**	**4,193**	**4,403**	**4,623**	**4,854**	**5,097**	**5,352**	**5,620**
OPEX													
Vehicle Operating Company													
Staff	6,981	439	461	484	508	533	560	588	617	648	680	714	750
Fuel / electricity	1,780	112	117	123	129	136	143	150	157	165	174	182	191
Maintenance and spare parts	19,115	1,201	1,261	1,324	1,390	1,460	1,533	1,609	1,690	1,774	1,863	1,956	2,054
Overheads	2,295	108	110	170	172	186	189	205	207	225	228	247	250
Taxes	9,569	637	666	675	707	736	770	802	839	873	915	952	996
Profit margin (based on 30% OCF margin)	6,553	473	492	475	495	509	531	545	568	583	608	624	650
VOC Total	**46,294**	**2,969**	**3,107**	**3,251**	**3,402**	**3,560**	**3,725**	**3,898**	**4,079**	**4,269**	**4,467**	**4,675**	**4,892**
System Control Service Provider													
Conductors	3,405	271	284	298	313	329	345	363	381	400	420	-	-
Station staff	4,257	338	355	373	392	411	432	454	476	500	525	-	-
IT and control centre staff	737	59	62	65	68	71	75	79	82	87	91	-	-
Management staff	205	16	17	18	19	20	21	22	23	24	25	-	-
Station cleaning and maintenance	285	23	24	25	26	28	29	30	32	33	35	-	-
Station utilities and supplies	285	23	24	25	26	28	29	30	32	33	35	-	-
Office costs	237	19	20	21	22	23	24	25	27	28	29	-	-
Taxes	3,468	276	290	304	319	335	352	370	388	407	428	-	-
Profit margin (based on 30% OCF margin)	4,597	366	384	403	423	444	466	490	514	540	567	-	-
SCSP Total	**17,475**	**1,389**	**1,459**	**1,532**	**1,608**	**1,689**	**1,773**	**1,862**	**1,955**	**2,053**	**2,155**	**-**	**-**
TransKarachi													
Payments to VOC	46,294	2,969	3,107	3,251	3,402	3,560	3,725	3,898	4,079	4,269	4,467	4,675	4,892
Payments to SCSP	22,115	1,389	1,459	1,532	1,608	1,689	1,773	1,862	1,955	2,053	2,155	2,263	2,376
Payments to Fund Manager	338	21	22	23	25	26	27	28	30	31	33	35	36
Staff	4,797	307	325	351	346	363	381	400	420	441	463	487	511
Overheads	1,028	66	69	72	74	78	82	86	90	95	100	105	110
Taxes	3,760	236	248	260	273	287	301	317	332	349	366	385	404
TransKarachi Total	**78,331**	**4,988**	**5,231**	**5,490**	**5,728**	**6,003**	**6,290**	**6,592**	**6,907**	**7,238**	**7,585**	**7,948**	**8,329**

Table 7: Yellow Line Revenues and OPEX Summary [in PKR millions] – FS 20 (5km) – FC2

	Total	Year 01	Year 02	Year 03	Year 04	Year 05	Year 06	Year 07	Year 08	Year 09	Year 10	Year 11	Year 12
REVENUES													
TransKarachi													
Fare revenues	42,316	2,658	2,791	2,931	3,078	3,231	3,393	3,563	3,741	3,928	4,124	4,330	4,547
Advertising on stations	7,749	487	511	537	564	592	621	652	685	719	755	793	833
Commercial activities on stations	2,234	140	147	155	162	171	179	188	198	207	218	229	240
TransKarachi Total	**52,299**	**3,286**	**3,450**	**3,622**	**3,804**	**3,994**	**4,193**	**4,403**	**4,623**	**4,854**	**5,097**	**5,352**	**5,620**
OPEX													
Vehicle Operating Company													
Staff	6,422	403	424	445	467	490	515	541	568	596	626	657	690
Fuel / electricity	1,818	114	120	126	132	139	146	153	161	169	177	186	195
Maintenance and spare parts	17,762	1,116	1,172	1,230	1,292	1,356	1,424	1,495	1,570	1,649	1,731	1,818	1,909
Overheads	2,194	108	110	162	164	177	180	195	197	214	216	235	238
Taxes	8,942	595	623	632	662	688	721	749	784	816	854	888	929
Profit margin (based on 30% OCF margin)	6,330	455	473	460	480	493	514	527	549	563	587	602	627
VOC Total	**43,468**	**2,792**	**2,920**	**3,055**	**3,197**	**3,344**	**3,499**	**3,660**	**3,830**	**4,006**	**4,192**	**4,385**	**4,588**
System Control Service Provider													
Conductors	2,999	238	250	263	276	290	304	320	336	352	370	-	-
Station staff	4,257	338	355	373	392	411	432	454	476	500	525	-	-
IT and control centre staff	737	59	62	65	68	71	75	79	82	87	91	-	-
Management staff	205	16	17	18	19	20	21	22	23	24	25	-	-
Station cleaning and maintenance	285	23	24	25	26	28	29	30	32	33	35	-	-
Station utilities and supplies	285	23	24	25	26	28	29	30	32	33	35	-	-
Office costs	237	19	20	21	22	23	24	25	27	28	29	-	-
Taxes	3,319	264	277	291	305	321	337	354	371	390	409	-	-
Profit margin (based on 30% OCF margin)	4,399	350	367	386	405	425	446	469	492	517	543	-	-
SCSP Total	**16,723**	**1,330**	**1,396**	**1,466**	**1,539**	**1,616**	**1,697**	**1,782**	**1,871**	**1,964**	**2,063**	**-**	**-**
TransKarachi													
Payments to VOC	43,468	2,792	2,920	3,055	3,197	3,344	3,499	3,660	3,830	4,006	4,192	4,385	4,588
Payments to SCSP	21,162	1,330	1,396	1,466	1,539	1,616	1,697	1,782	1,871	1,964	2,063	2,166	2,274
Payments to Fund Manager	338	21	22	23	25	26	27	28	30	31	33	35	36
Staff	4,797	307	325	351	346	363	381	400	420	441	463	487	511
Overheads	1,028	66	69	72	74	78	82	86	90	95	100	105	110
Taxes	3,598	226	237	249	262	275	288	303	318	334	351	368	387
TransKarachi Total	**74,391**	**4,741**	**4,971**	**5,217**	**5,442**	**5,702**	**5,974**	**6,260**	**6,559**	**6,872**	**7,201**	**7,545**	**7,905**

KARACHI
BUS RAPID TRANSIT
PROJECT

PACKAGE 3: OPERATIONAL DESIGN AND BUSINESS MODEL (ODBM)

OUTPUT 4.4 - YELLOW LINE – OPERATIONAL PLAN

May 2019

Exponent Engineers (Pvt) Limited
Consulting Engineers & Project Managers

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1. Introduction

The objective of this output is to present the Operational Plan for the Red Line of the Karachi BRT System.

Appendix D – Yellow Line Operational Plan Model is divided in six chapters that assist the reader to better understand how the operational plan was elaborated and how it works. The chapters are as following:

1. Introduction
2. BRT Services Route Network
3. Inputs for BRT Services Operational Plans
4. BRT Red Line Operational Plan
5. Maintenance Plan for Fleet
6. Recommendations for Operational Plan Implementation

Chapter 2 explains the criteria adopted in the definition of the route plan and the general context of the Yellow Line project, followed by the presentation of the current route plan itself. As several scenarios were modelled in order to provide insights for the operational plan definition, such scenarios are explained in detail in chapter 4.

BRT Yellow Line Operational Plan presents the main information from the transport model that is applied in this stage, as well as the methodology that was used. With this information, the operational plan for each of the modelled scenarios is specified, and the applied methodology is explained. In chapter 5, the maintenance plan for the BRT fleet is presented and the recommendations for the Operational Plan Implementation, such as transition time and implementation strategy is described.

Considering the implementation process of the system, it is considered that, at a first moment, only the Red Line corridor will operate (alongside Green, Orange and Common Corridor). In a second moment, Yellow Line corridor start operating as well, as presented in the following figure.

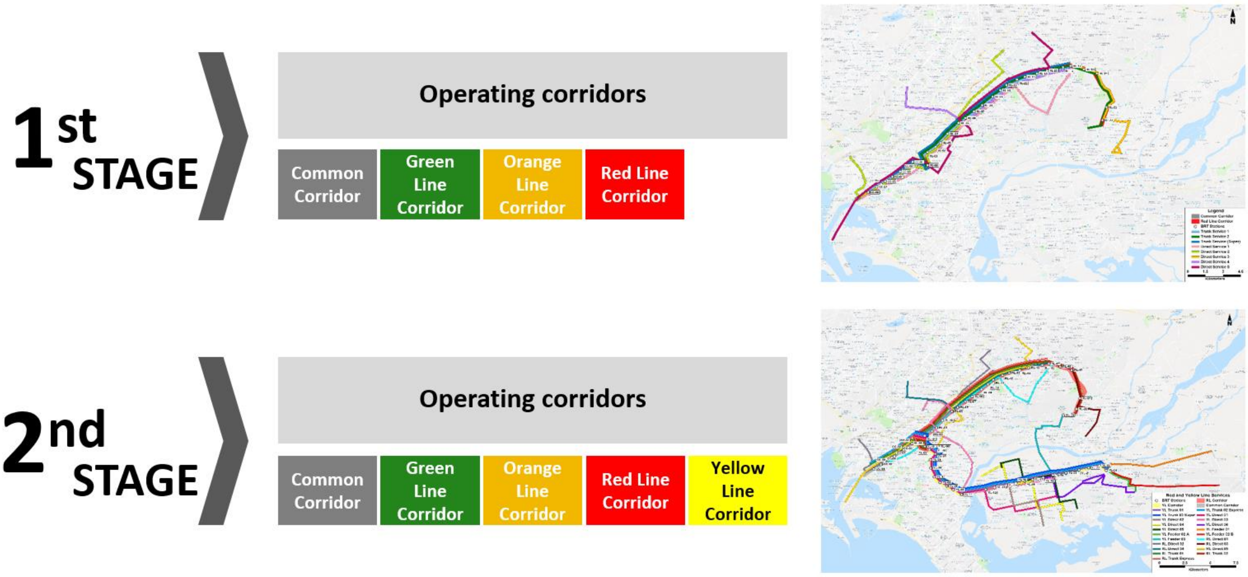


Figure 1.1: BRT implementation sequence

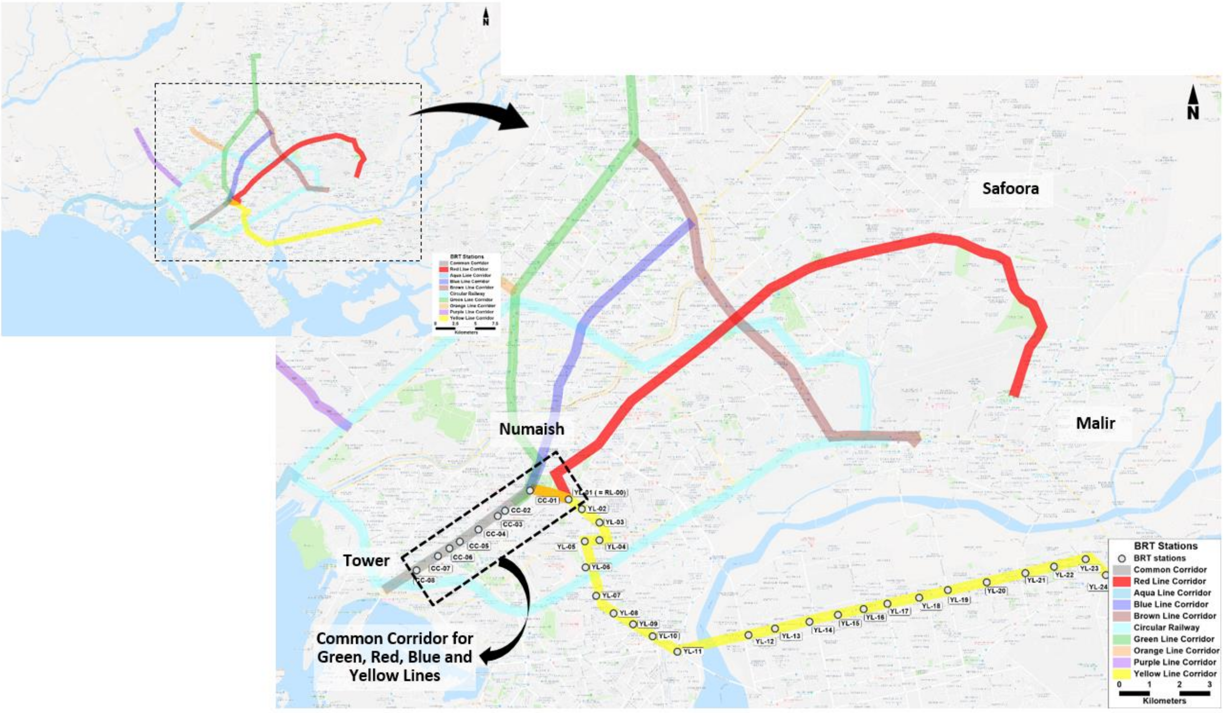
2. BRT Services Route Network

The BRT route network proposed for Karachi BRT considers the concept of ‘Direct-services’, where BRT services can run on and off-corridor, connecting the main origins and destinations. This route design promotes time savings for the users, as it reduces the necessity of transfers between BRT services. It also does not require many transfer stations, in contrast to other configurations, thus it can promote infrastructure cost savings due to less terminals and intermediate transfer stations.

In order to promote a high level of service for the direct services, it is recommended to take some actions, especially in the off corridor sections, to minimize delays and preserve scheduling standards. The operational control centre, supported by the necessary ITS infrastructure, should monitor the operation in real time on a daily basis.

With this, measures to mitigate the impact of disturbances in the system (e.g. traffic accidents) can be taken in real time. Furthermore, infrastructure improvements in off corridor sections and favourable public transport policies, such as high quality pavement and preferential bus lane, lead to an increase on average service speed.

The following figure presents the Yellow Line corridor, the common corridor (which will serve Green, Red, Blue and Yellow Line) and other public transport projects in Karachi, clarifying the context in which the Yellow Line project part of.



The following figure presents the complete route plan for Yellow Line, and all the main corridors of the other lines.

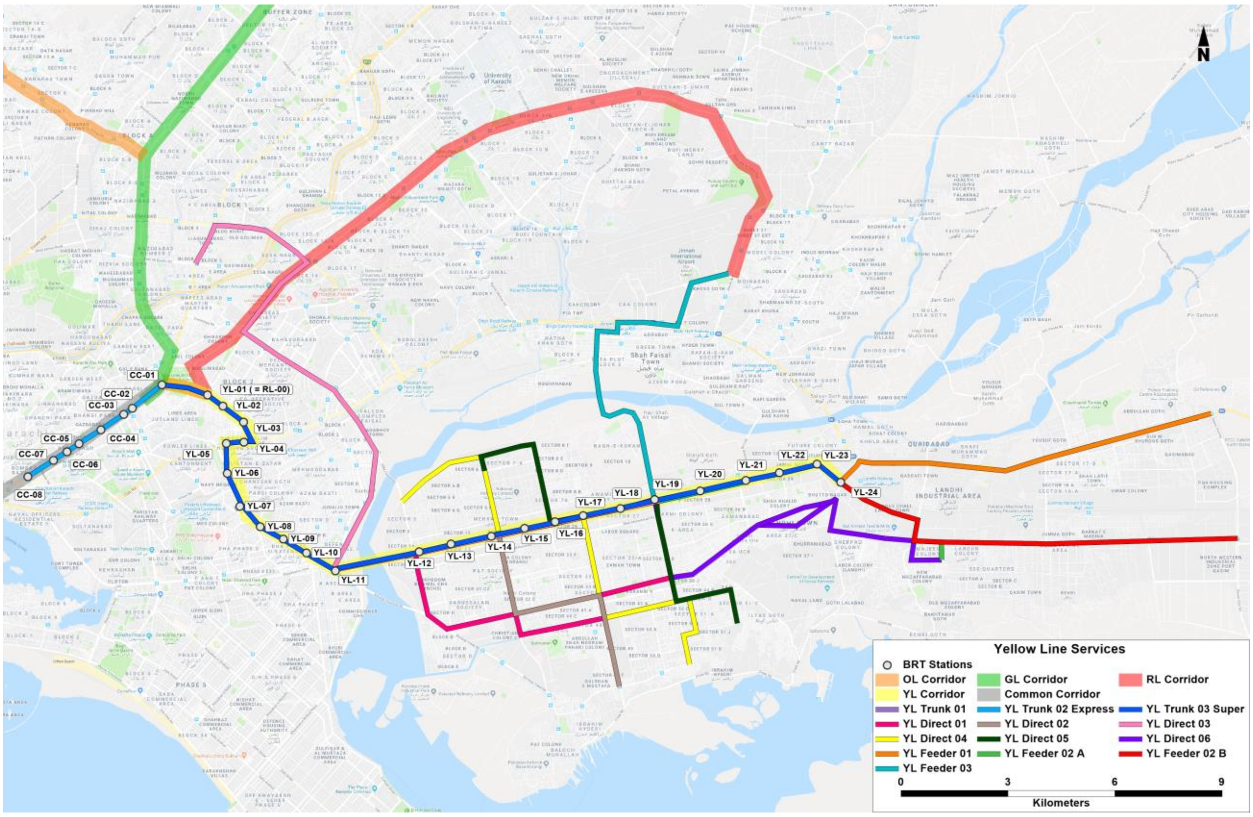


Figure 2.1: BRT Routes of Yellow Line

The Yellow Line corridor will present two types of services: the first one will be the express service, which will stop only at the most demanded stations – the stations that attract the greatest number of users for the system. The second type will be the stopping services, which will stop at all stations of the corridor.

The basis to the route selection for each BRT service were the surveys conducted in Karachi (Frequency and Occupancy survey and Origin and Destination survey, on-board and stop-based) - described in detail in Appendix A, Complementary Surveys of Interim Report 1. In addition, the current public transportation routes (seeking to maintain the public transport coverage with the BRT system) and the discussions among the involved parties were also considered. The proposed routes have proven by the modelling data that will carry a great number of passengers. All proposed routes are presented in the following items.

2.1 Routes of Yellow Line corridor

The proposed routes for the Yellow Line operation are presented in Figure 2.2 to Figure 2.9, followed by Figure 2.15 showing the configuration of the off-corridor bus stops and terminals.

The detailed Yellow Line Route Plan & Bus Stops can be found in KMZ format as part of Appendix B.1 - Operational Plan.

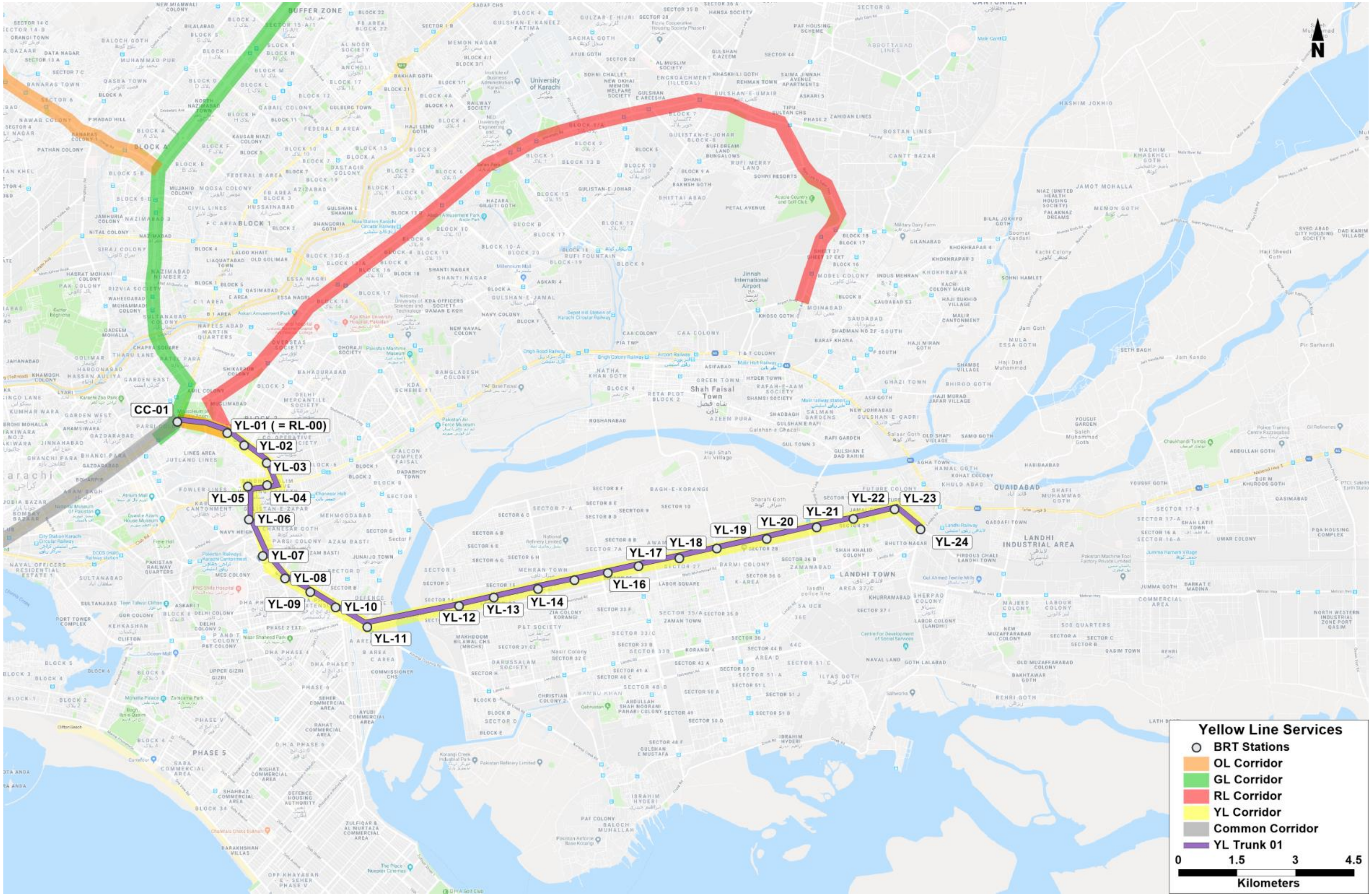


Figure 2.2: Yellow Line – Trunk Service 01

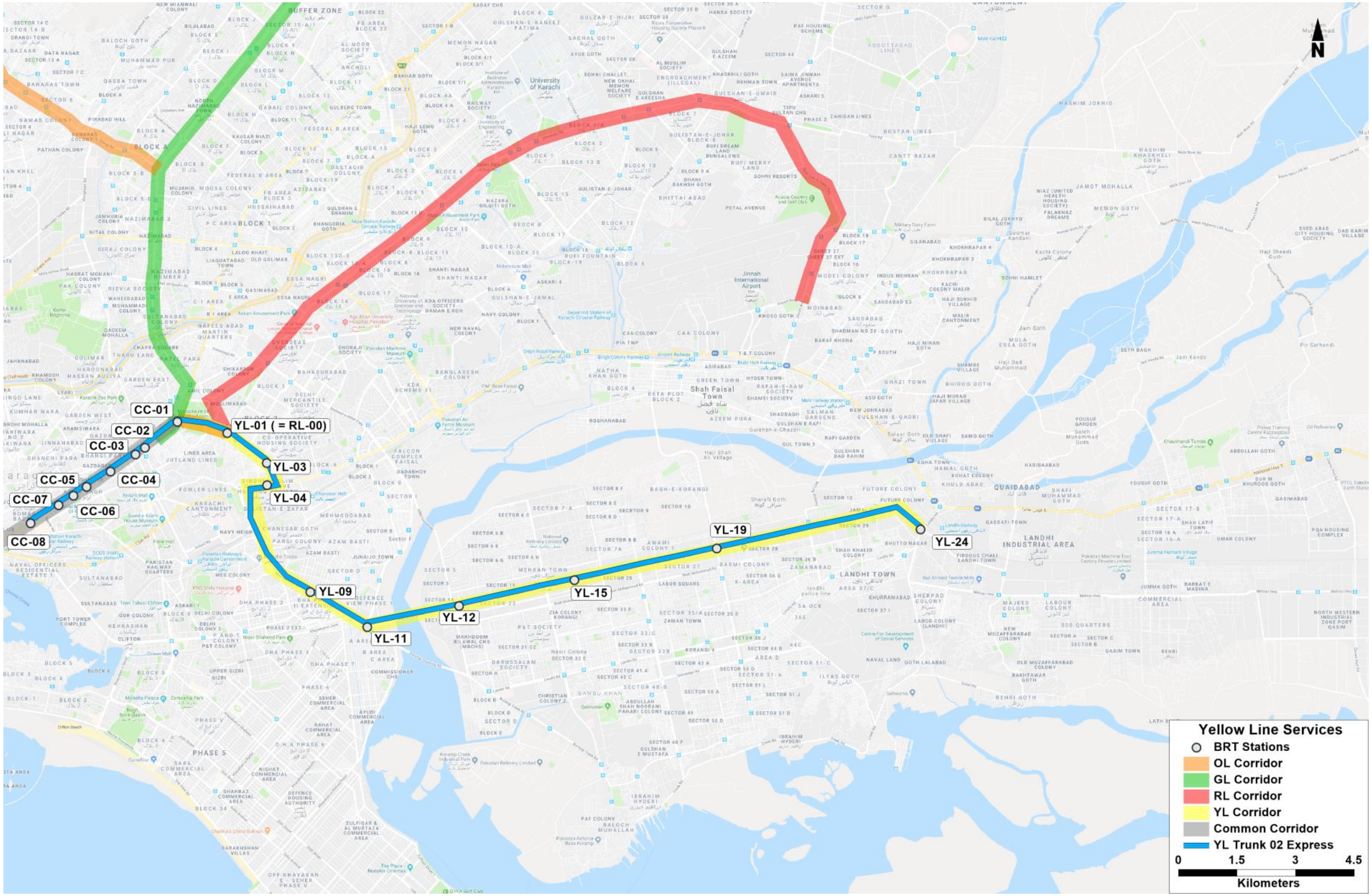


Figure 2.3: Yellow Line – Trunk Service 02

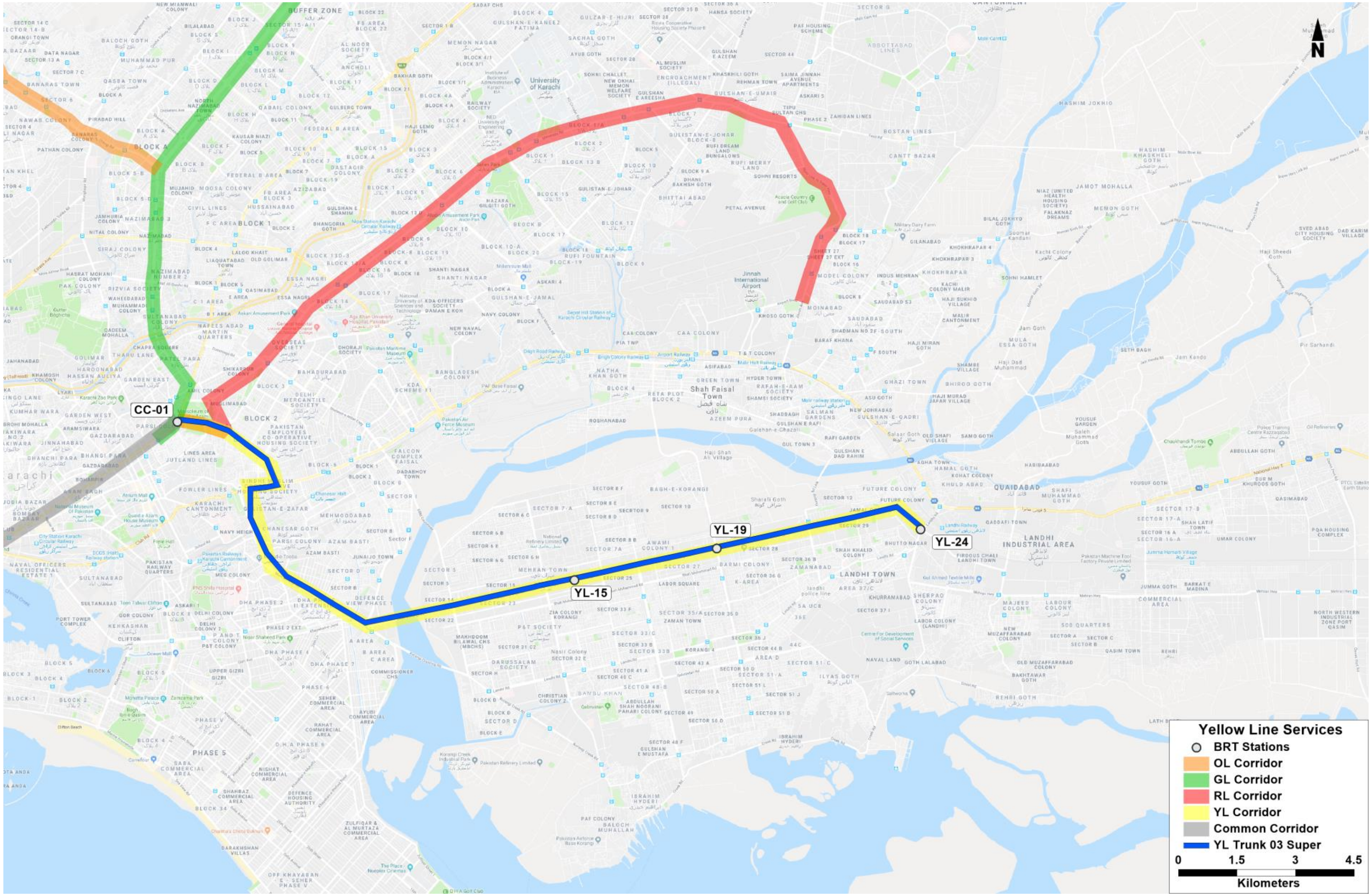


Figure 2.4: Yellow Line – Trunk Super Express

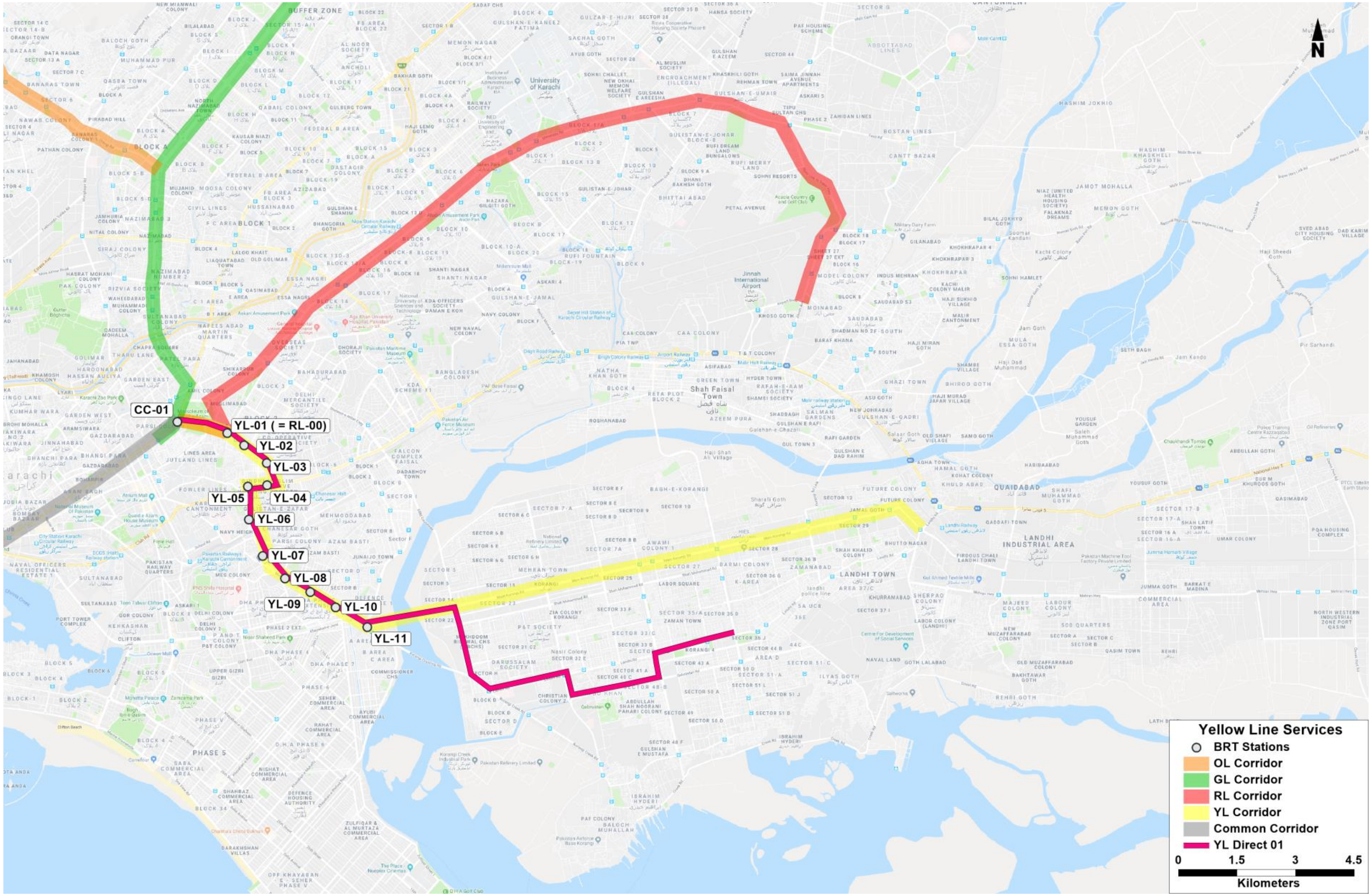


Figure 2.5: Yellow Line – Direct Service 01

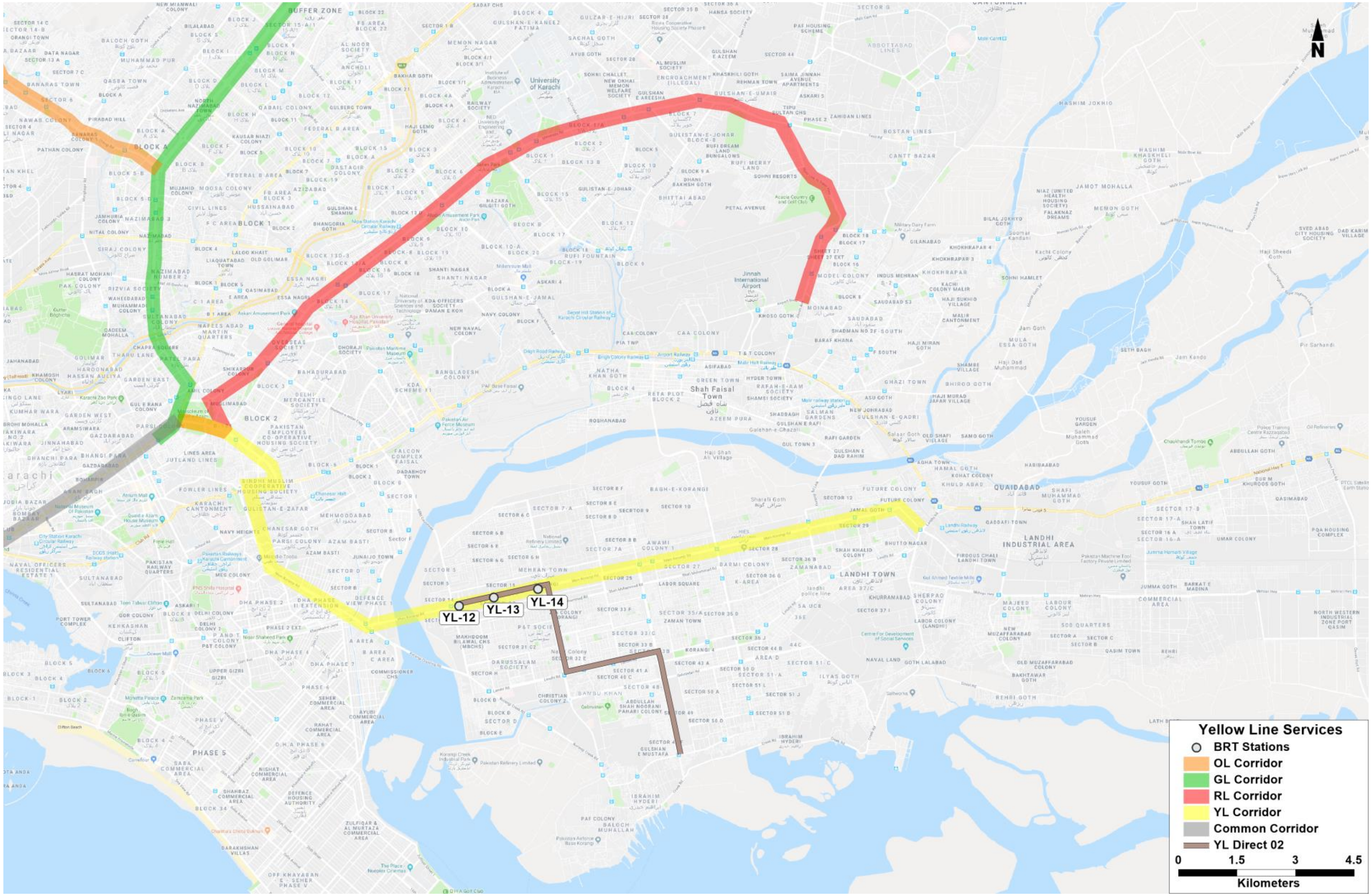


Figure 2.6: Yellow Line – Direct Service 02

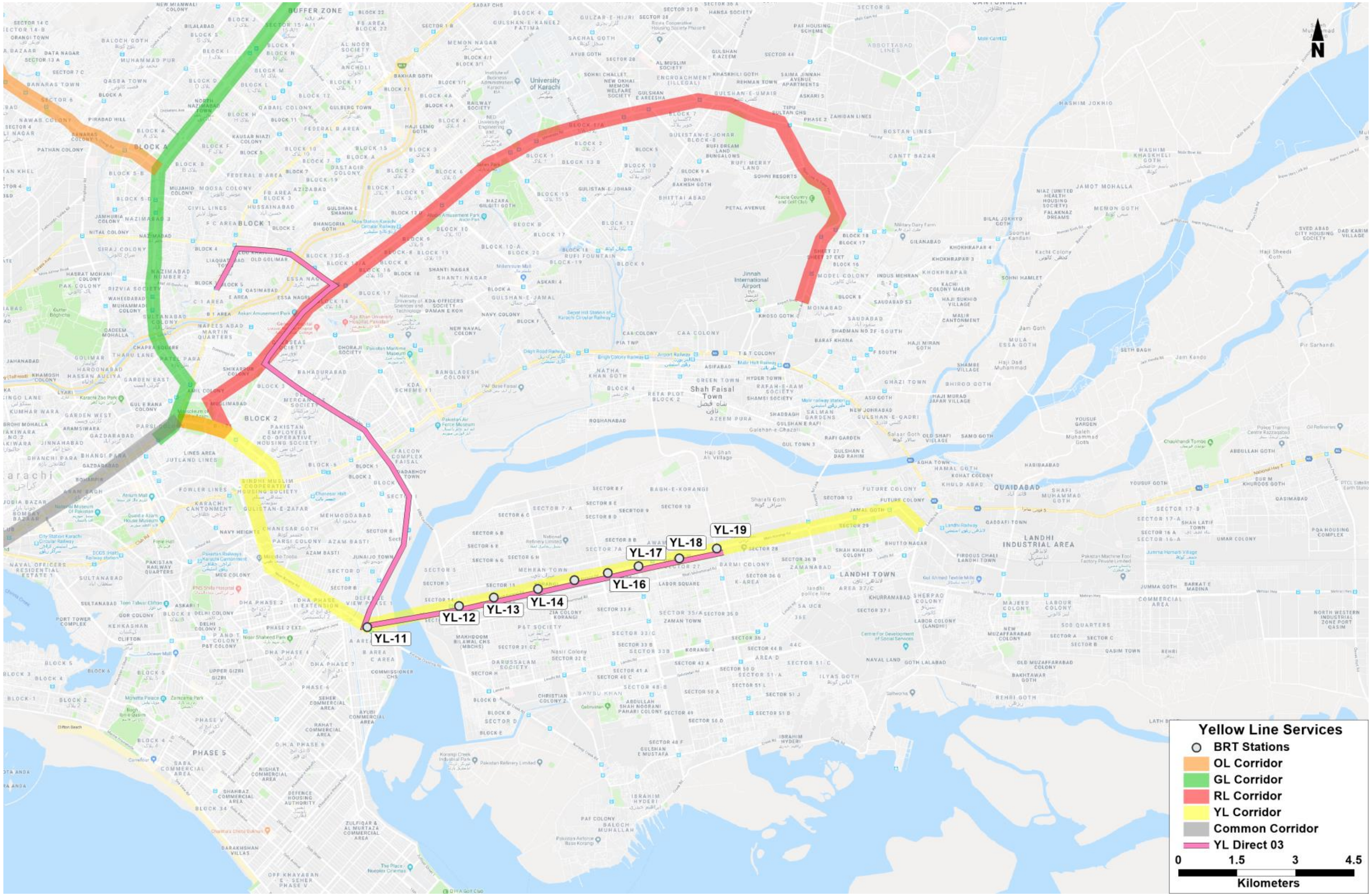


Figure 2.7: Yellow Line – Direct Service 03

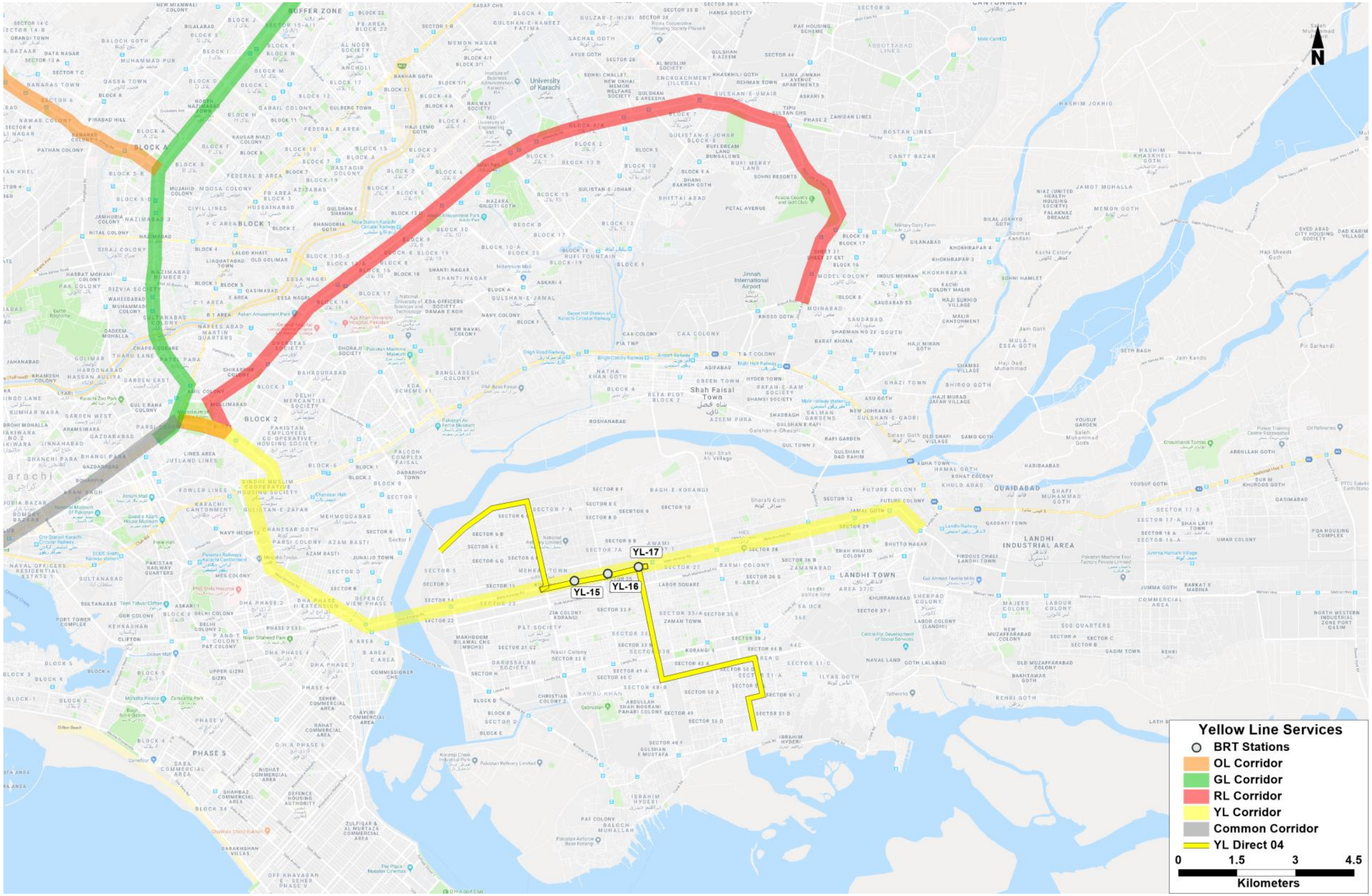


Figure 2.8: Yellow Line – Direct Service 04

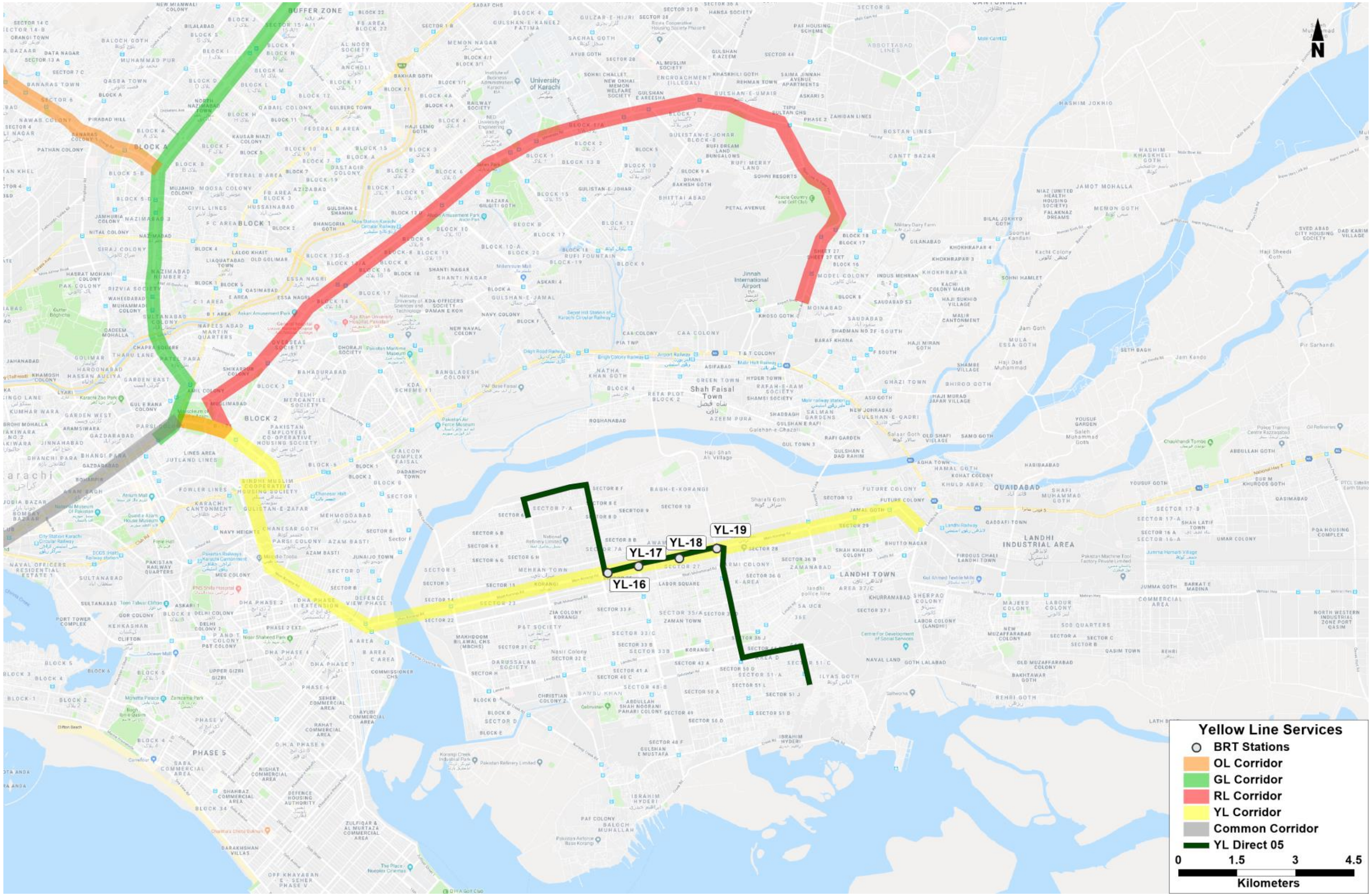


Figure 2.9: Yellow Line – Direct Service 05

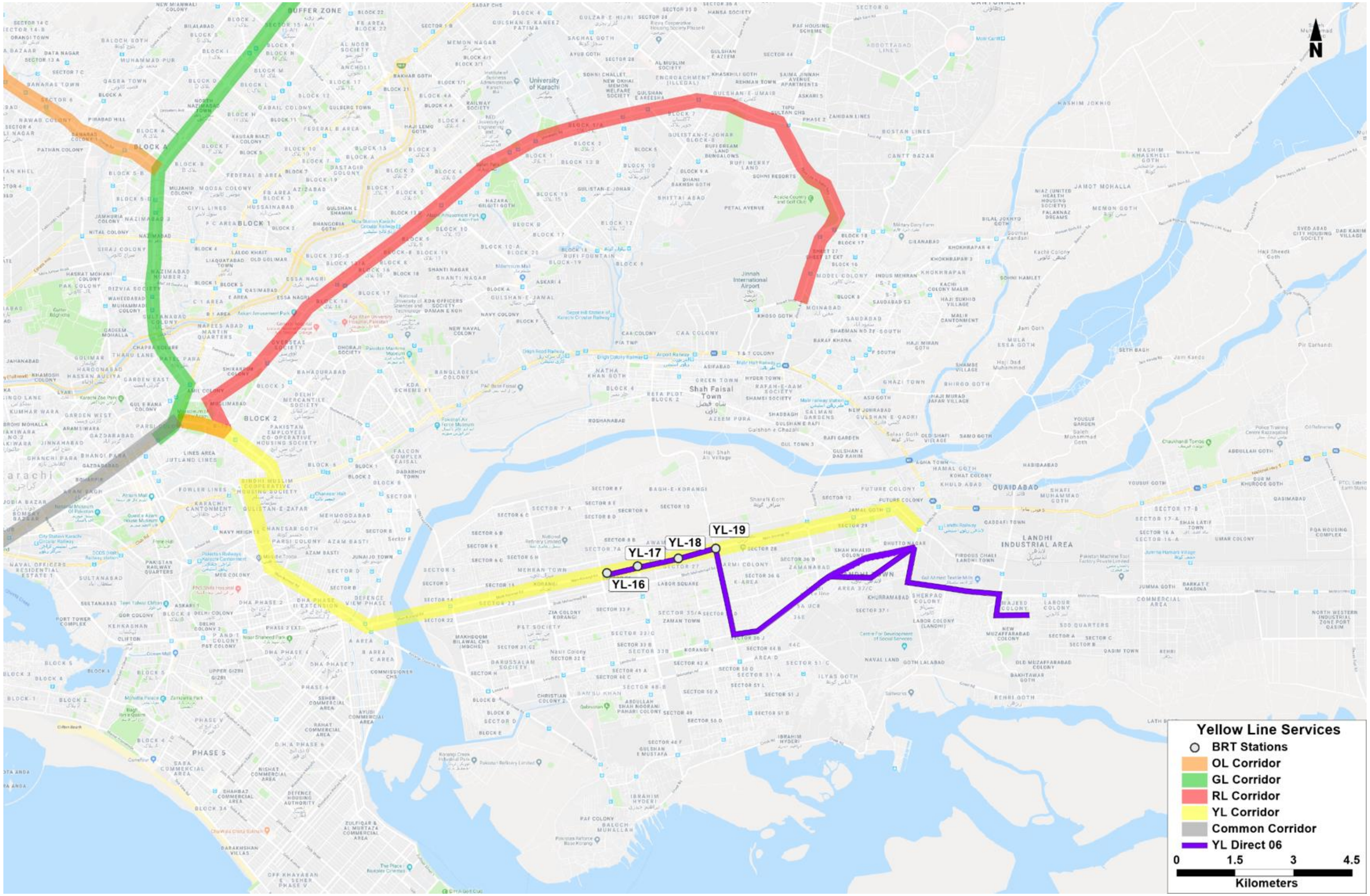


Figure 2.10: Yellow Line – Direct Service 06

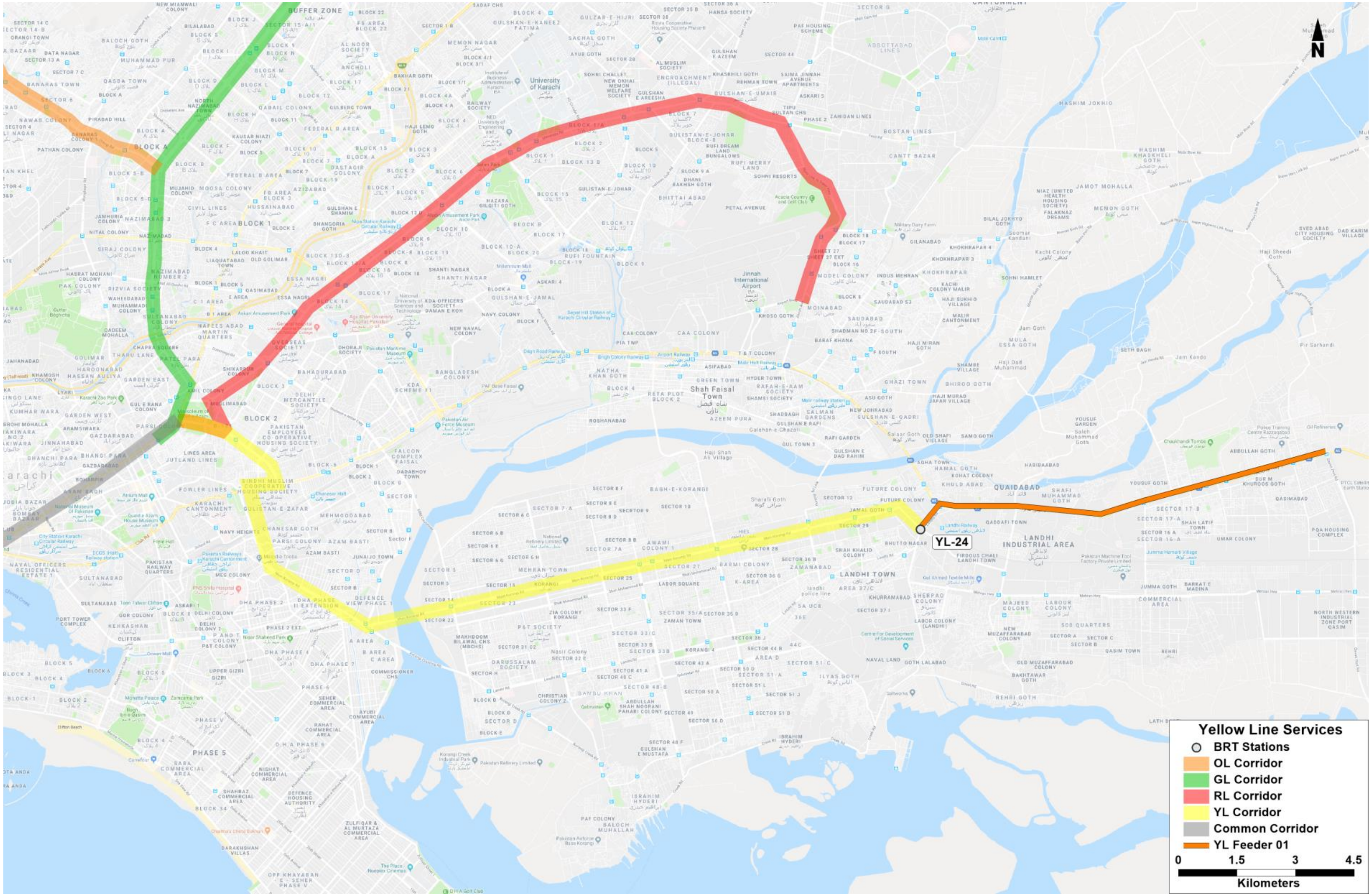


Figure 2.11: Yellow Line – Feeder Service 01

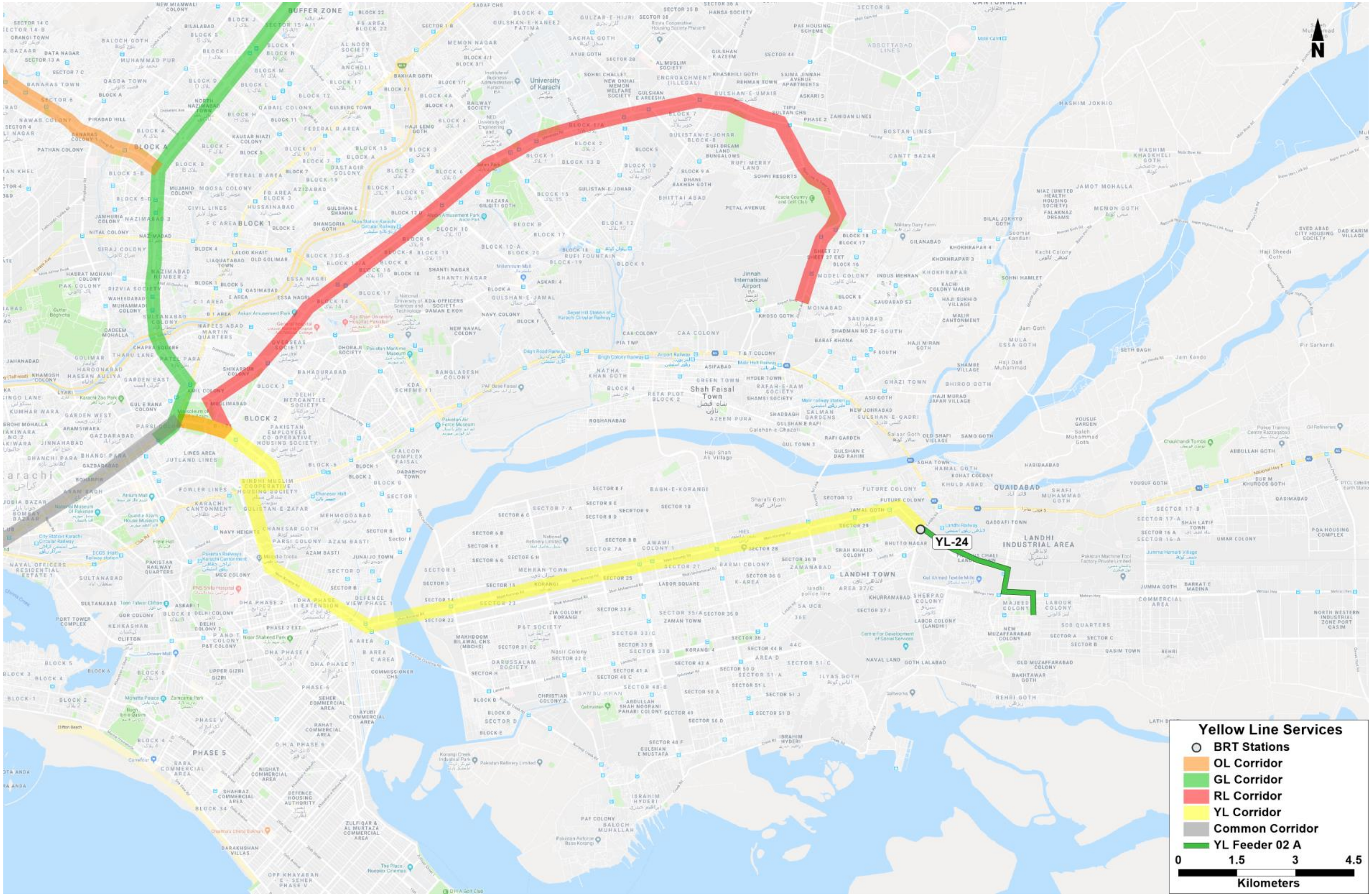


Figure 2.12: Yellow Line – Feeder Service 02 A

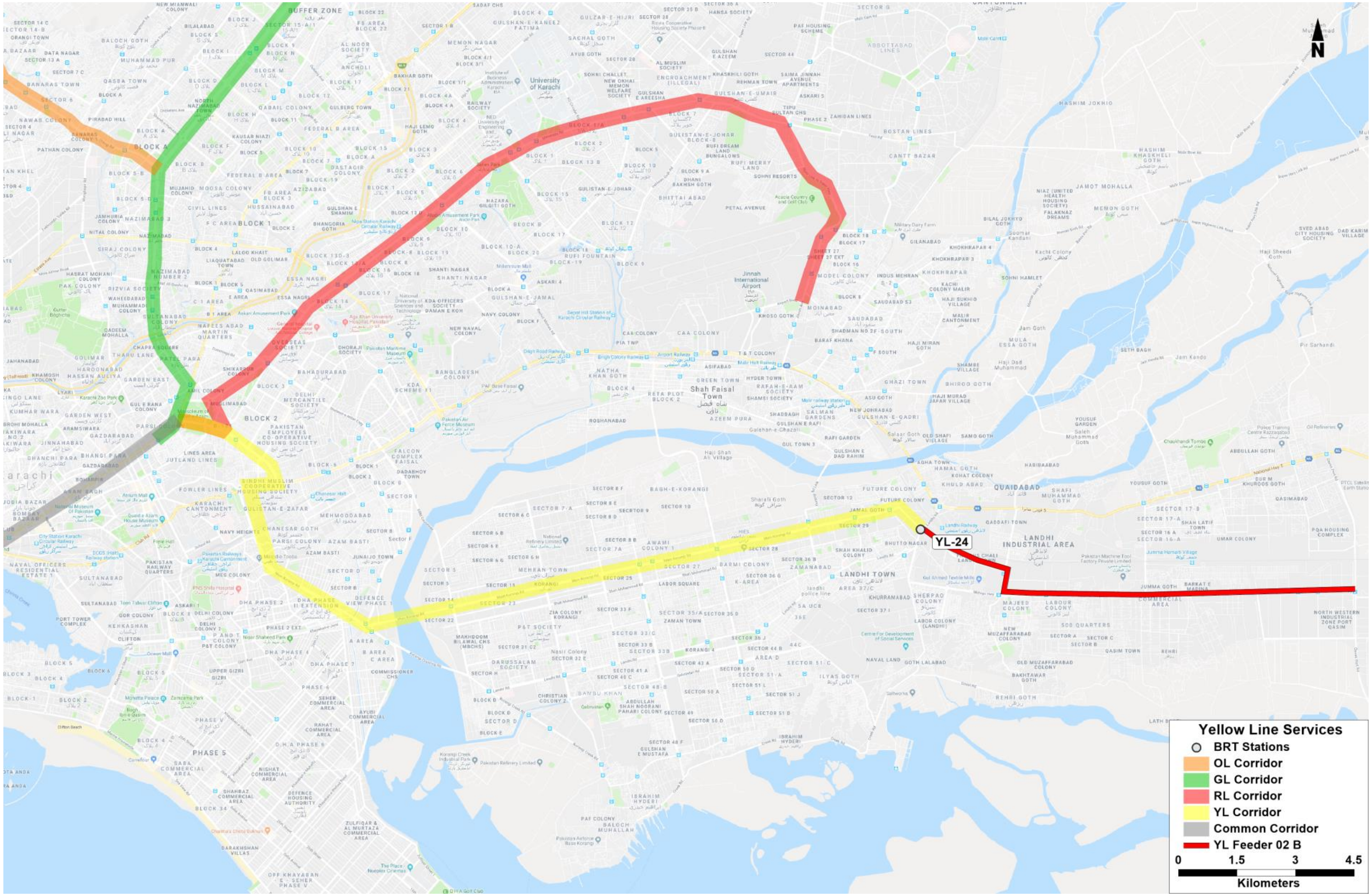


Figure 2.13: Yellow Line – Feeder Service 02 B

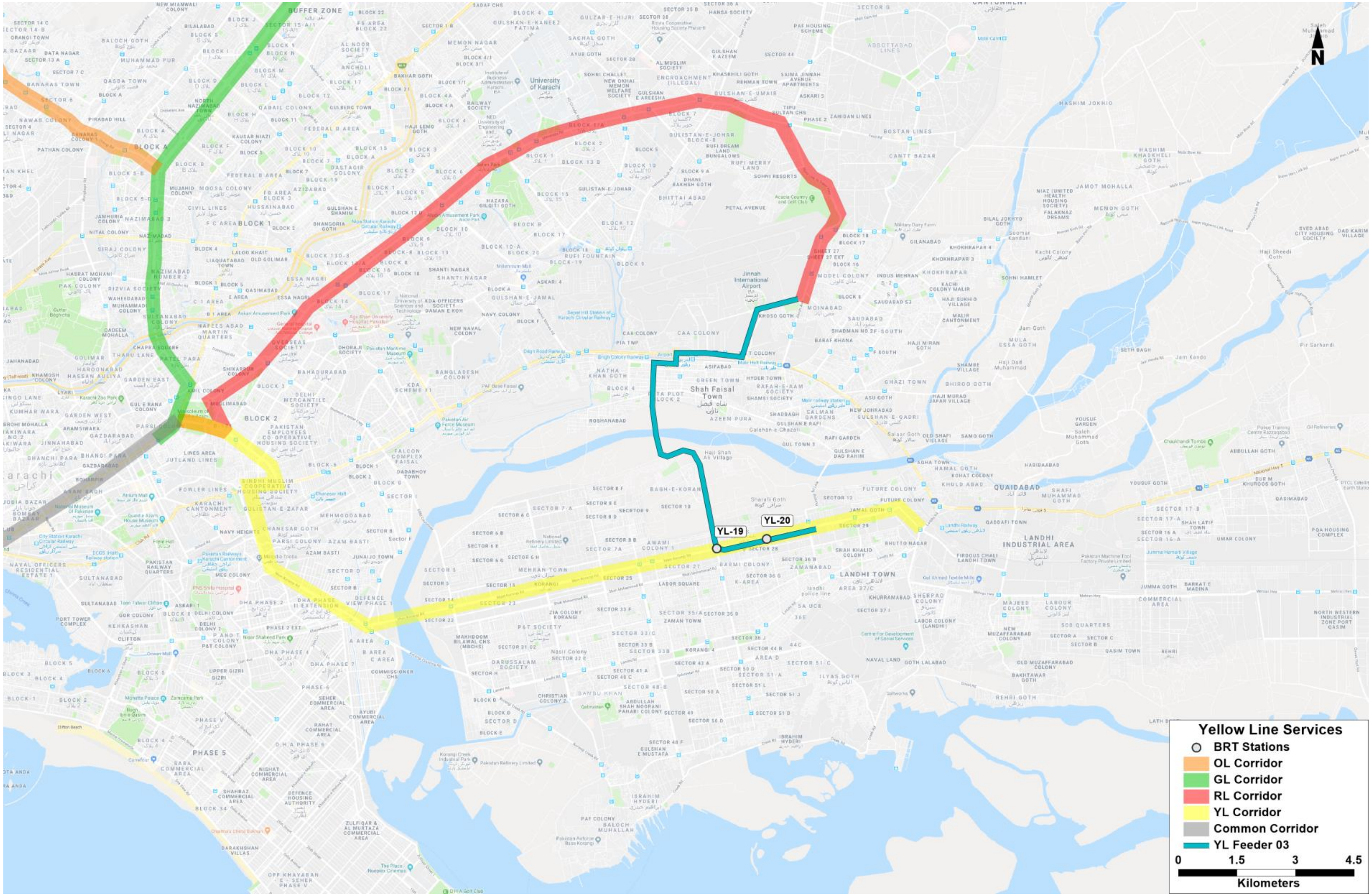


Figure 2.14: Yellow Line – Feeder Service 03

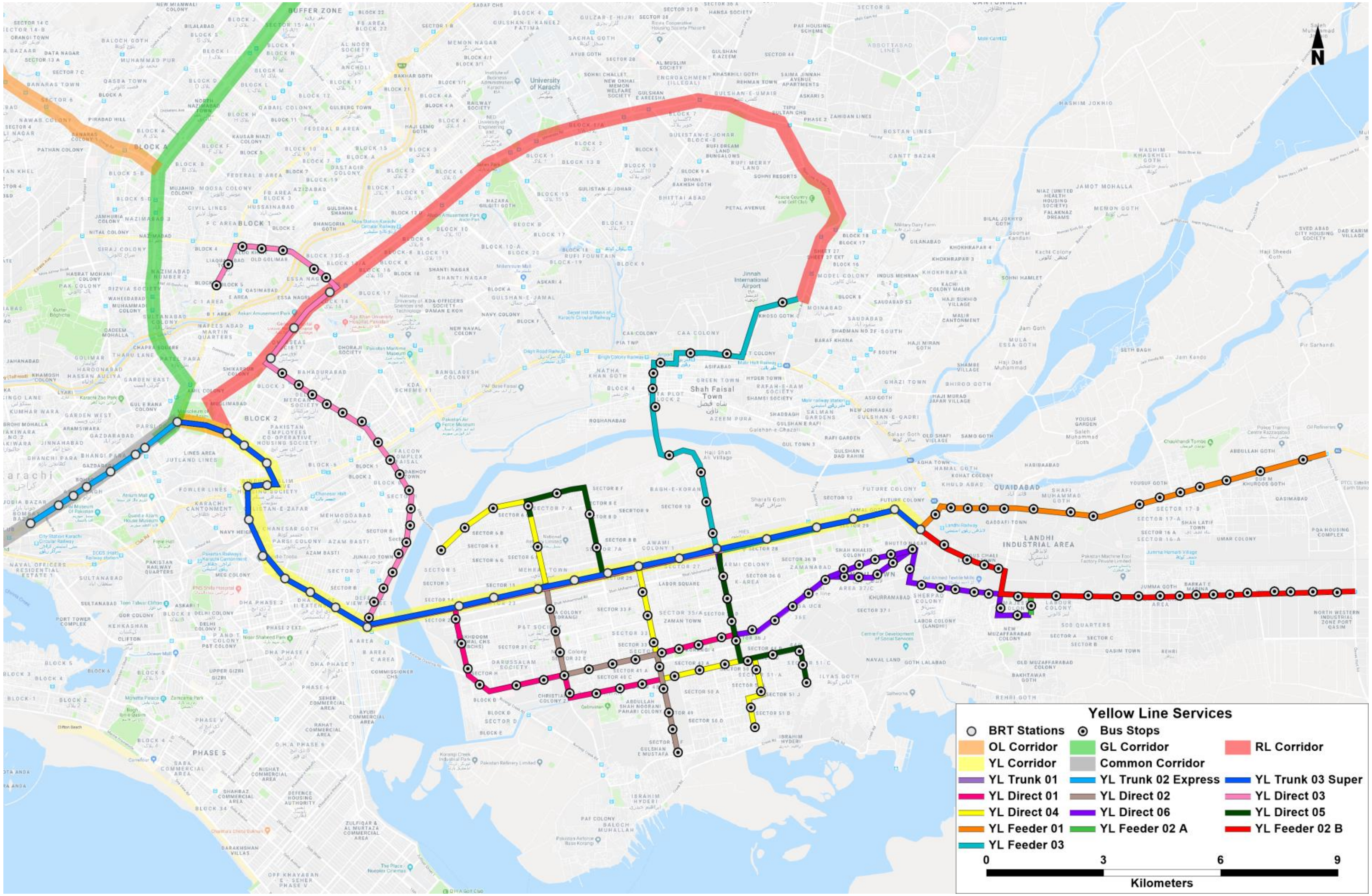


Figure 2.15: Off-corridor bus stops and terminals

2.2 Impacts on the current public transportation services

Due to the implementation of the new BRT system in Karachi, the current public transportation system, composed primarily of Coaches, Mini Buses and Large Buses, will be reduced. The operation of these services that run in the BRT corridor will cease with the start-up of the system, as detailed in the Bus Industry Restructuring Plan. All current public transportation routes of Karachi, including an evaluation of the percentage level of interference with the BRT corridor, are detailed in Interim Report 1 – Appendix A, item 3.3.

The start-up of the BRT operation will result in changes on the existing routes, such as the shortening, removal or re-routing of some routes. The following table summarizes the changes in the current public transportation routes with the implementation of the Yellow Line Corridor. The Yellow Line Revised Public Transport Routes (KMZ file) are also presented in the digital annex Appendix B.1 - Transport Modelling Dataset, which presents in detail all affected routes.

Table 2.1: Impact over existing public transportation routes due to the implementation BRT Corridor

Route	Status
1-L	Shortened
16-D	
16	
C-1	
City Coach	
D-11	
F-18	
F-21	
M-1	
Mashriq Coach	

Route	Status
N-5	Shortened
N	
New Afridi Coach	
Z-2	
Abdullah Coach	Re-routed
IllyaS coach	
Marwat Coach	
1-D	
17-K	Removed

Due to this transition on the public transportation system, a great number of vehicles will need to be scrapped as part of the implementation of the BRT services. The scrapping plan aims to avoid that the removed buses start to operate illegally competing with the BRT services, which could reduce the BRT demand and decrease the fare revenue to pay the operational costs.

3. Inputs for BRT Services Operational Plans

This item presents the scenarios that were considered in this evaluation, the methodology applied for the demand modelling and the main outputs from the transport model for each considered scenario.

3.1 Modelled scenarios

The modelled scenarios were based on combinations of different premises for:

- Route plan
    - Several route plans were evaluated during the decision making process, and the one presented in this report is the result of this optimization process

- Fare Structure (FS)
    - Higher and lower fare structures were evaluated for a better understanding of the population behaviour when facing different BRT costs
- Fleet composition (FC)
    - The analysis considered 9m, 12m and 18m buses to be used in the different services, and the combinations presented in this report are the result of this process

The model considers the operation of Green, Orange and Red lines and their influence in the transportation demand in Karachi. It should be noted that, as the feeder/direct services of Green and Orange lines are not yet defined, the model only considers the trunk services (within corridor) operation for those lines. The fleet compositions for the modelled scenarios are summarized in the following table.

Table 3.1: Modelled scenarios

Fleet Composition for the evaluated scenarios	
FC ID	**Description**
FC 1	Trunk services: 18m
	Direct services: 12m
	Feeder services: 9m
FC 2	Trunk services: 18m
	Direct and Feeder services: 12m

The modelled fare structures are explained in detail in item 3.2.2, and in summary are the following:

- FS from 15 to 55 PKR, with 5 PKR increases every 2km
- FS from 10 to 40 PKR, with 5 PKR increases every 5km
- FS from 20 to 50 PKR, with 5 PKR increases every 5km

It should be noted that all results presented in the following items refer to Yellow Line only indicators. In other words, the model considers the existence and operation of Red and Green/Orange Line corridors, but daily demand, fleet and other presented indicators are relative to only the Yellow Line (unless explicitly stated otherwise).

3.2 Demand transport modelling

In order to develop the Operational Plan, it is necessary to input information both from surveys and from the transport model. The following items present the process for obtaining such information.

3.2.1 Demand data from Complementary surveys

The modelling process aims to create a simulated scenario of the whole city for a specific period of time, which is, for this project, one hour within the morning peak period[1]. As a natural consequence, not only the inputs for the modelling must refer to this time, but all outputs must also refer to this specific hour of general weekday.

---

[1] As presented on Interim Report 1, Appendix B, the morning peak refers to the period from 7AM to 10AM.

In order to develop the Operational Design for the whole day, not only for weekdays but also for Saturday and Sunday, it is necessary to relate the peak hour of a typical weekday with all other hours of all other days, which is done by analysing the Frequency and Occupancy Survey.

For two locations the frequency and occupancy survey was conducted on a weekday, a Saturday and a Sunday (FOV-04 and FOV-40), and for two other locations it was conducted on five weekdays, a Saturday and a Sunday (FOV-05 and FOV-35), as presented in the following map.

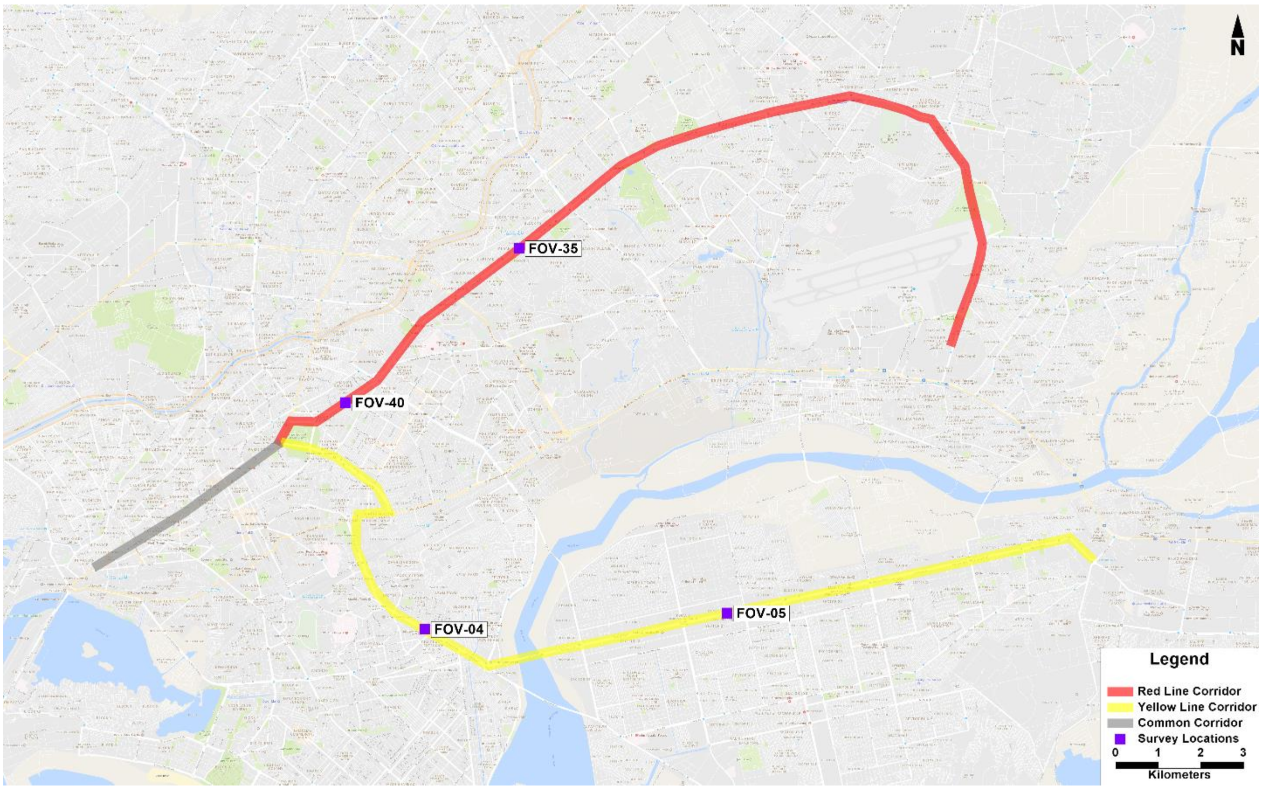


Figure 3.1: Frequency and Occupancy survey locations analysed

With information from the frequency and occupancy survey for the four locations, it was possible to develop the peak factor. This factor is obtained by comparing each hour, of each day (Weekday, Saturday and Sunday), with the volume of the peak hour. With this, it is possible to obtain the daily pattern for each day based on the peak hour, as presented in the following figures.

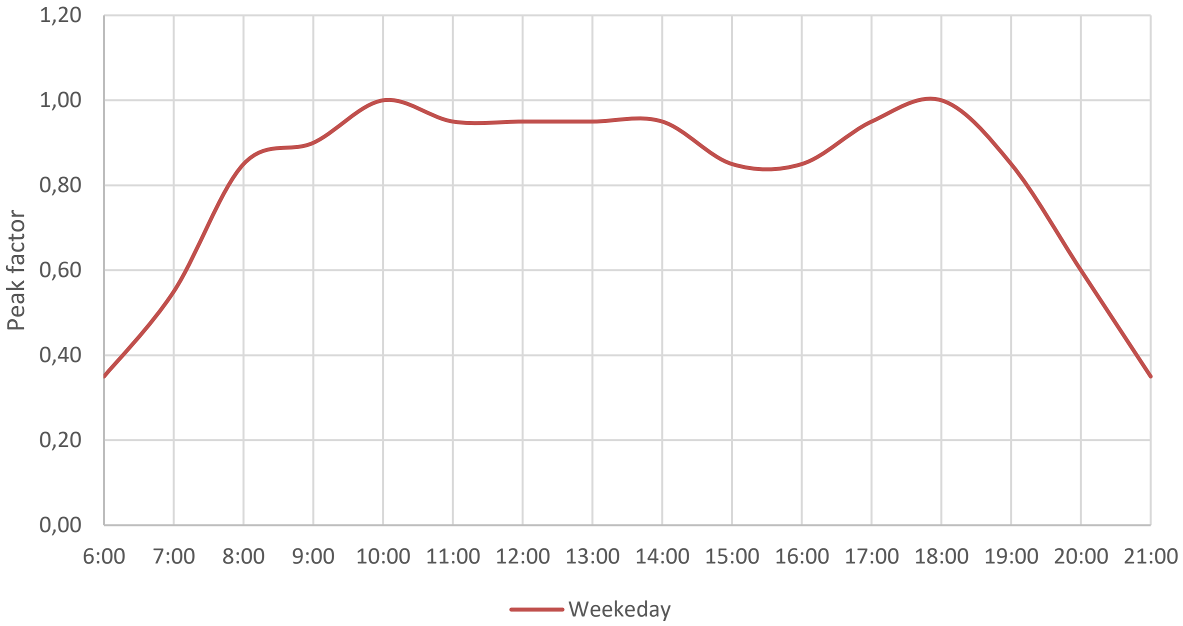


Figure 3.2: Daily peak factor for a typical Weekday

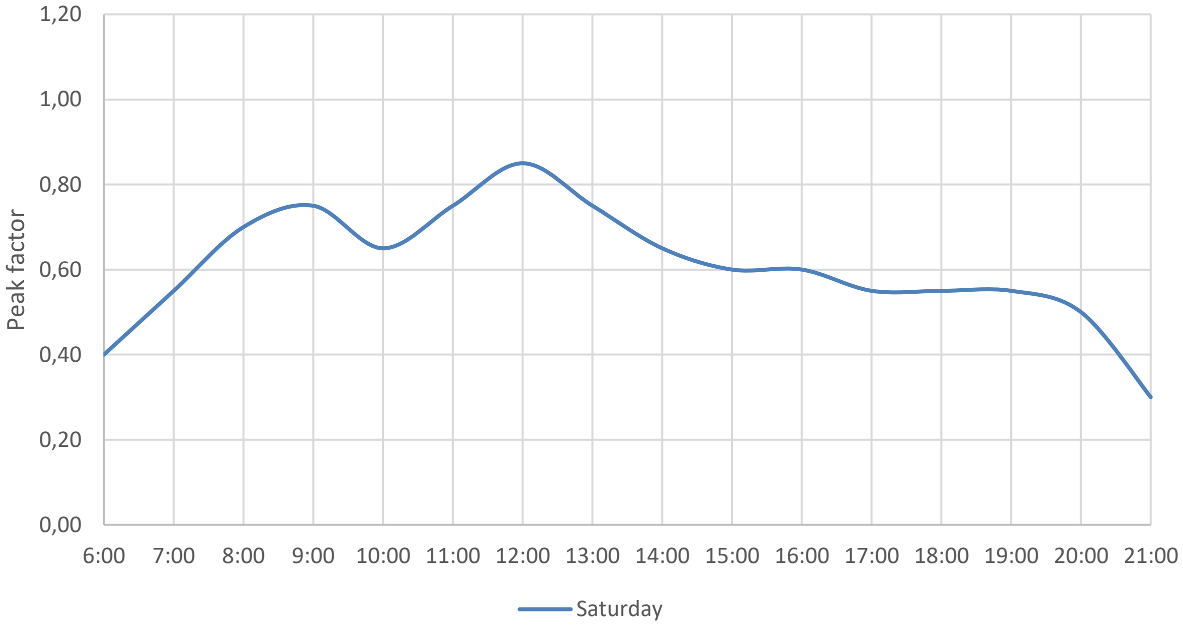


Figure 3.3: Daily peak factor for a typical Saturday

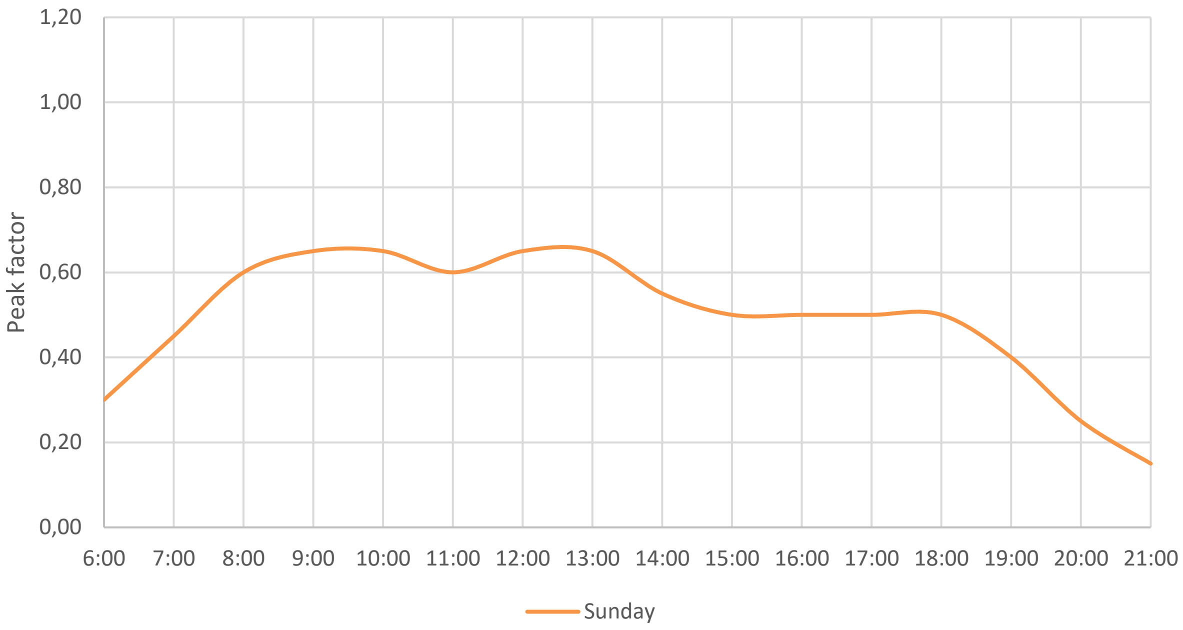


Figure 3.4: Daily peak factor for a typical Sunday

With this daily peak factor, it was possible to obtain the total daily factor, which is how many times the peak volume happens within a day (total daily volume divided by peak hour volume). In addition, it was possible to obtain the yearly factor, which correlates how many weekdays happen within a whole year. All this information is presented in the table below.

Table 3.2: Expansion factors for Karachi

Period	Factor	Unit
Weekday	12.9	Daily volume/peak volume
Saturday	9.70	Daily volume/peak volume
Sunday	7.90	Daily volume/peak volume
Year	304	Yearly volume/daily volume

3.2.2 Fare Structure

The BRT demand is directly affected by the adopted fare structure, and this item presents the modelled fare structures and the existing services fare structure.

In Karachi, the public transportation routes are composed of three different types of vehicles: Coaches, Mini Buses and Large Buses. All of the three vehicle types run under the same fare structure, which is the distance based structure shown in the following figure

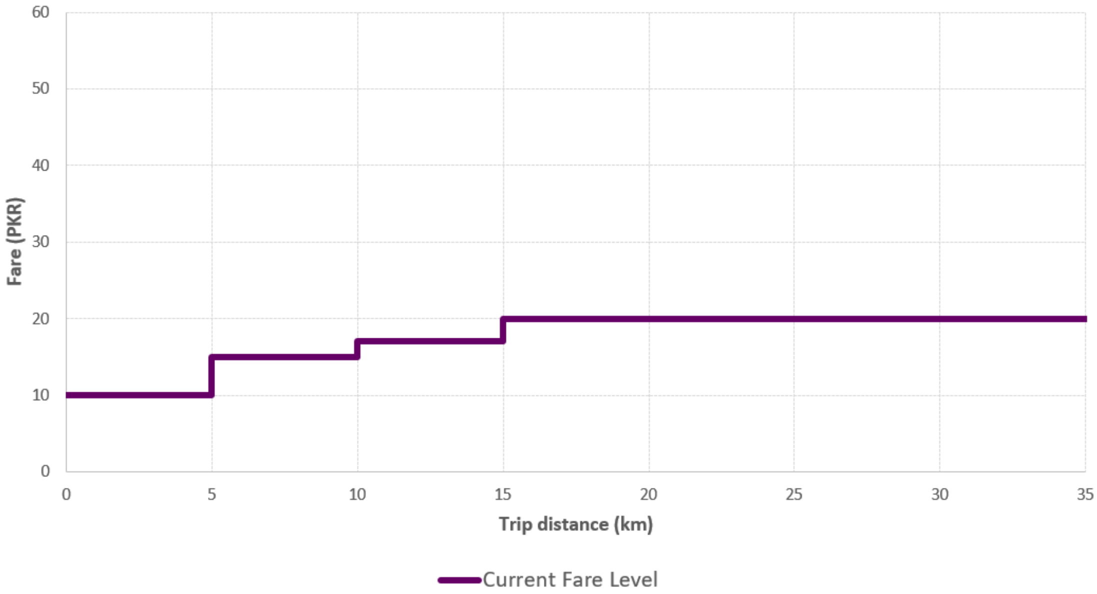


Figure 3.5: Current fare structure of Coaches, Mini Buses and Large Buses

Since BRT customers are price sensitive, three Fare Structures (FS) have been simulated in the transport demand model for financial analysis of the proposed operational design scenarios. With that being said, as higher the price gets, lower passenger uses the system. The following figure presents the Fare Structures considered for simulation. It should be noted that all BRT lines of the system are expected to operate based on the same fare structure.

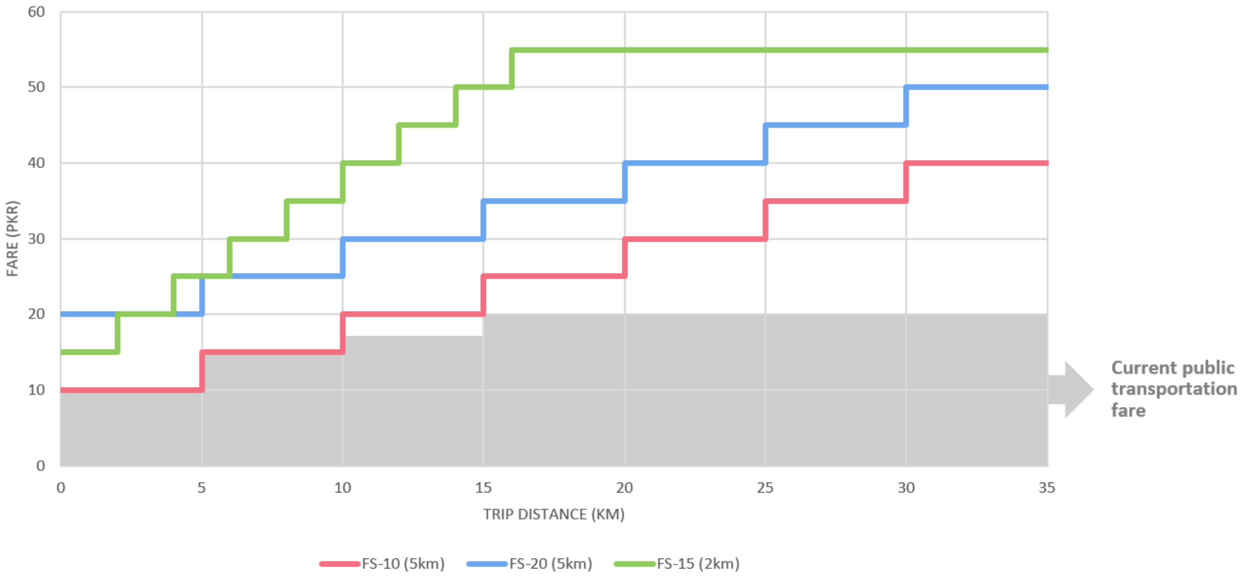


Figure 3.6: Fare Structures scenarios for modelling purposes

In summary, the are three modelled fare structures:

- FS 15-55 PKR with 5 PKR increase every 2km
- FS 10-40 PKR with 5 PKR increase every 5km
- FS 20-50 PKR with 5 PKR increase every 5km

This information affects directly on the results from the transport modelling. For example, if the fare is low, it is highly likely that several people will use the BRT. On the other hand, if there is a high fare, it is highly likely that several people will choose to do their travels by walk, or by alternative transport modes, such as rickshaws, for example. Hence, the fare structure has direct impact on the maximum load that comes from the transport model, which thus impacts on the final fleet required for operating the system.

3.2.3 Modal Shift

The demand for passengers using the BRT considers, in addition to the current users of the public transport system, the migration from users of Rickshaw, Private Cars and Motorcycles.

The Rickshaw, Private Cars and Motorcycle demand matrices were obtained from the matrix estimation procedure based on the field volume counts surveys, and then it was considered that a portion of these current demand would migrate to BRT services.

The proportion of each Origin-Destination pair was determined on the basis of a Logit discrete choice model, calibrated from data obtained on the willingness to pay survey. In order to develop this discrete model, the first step was to develop two Utility functions (U) for the analysed mode (Rickshaw, Private Cars and Motorcycle) and the BRT.

With this both functions, the Logit discrete choice model was then developed, with the probability P of choosing one of the modes, as per the presented below.

3.2.3.1 Passengers from Rickshaw

Utility functions (U) for Rickshaw and BRT:

$$U_{Rickshaw} = -0.0716232\,.\,Cost_{Rickshaw} + 0.0716232\,.\,Cost_{BRT}$$

$$Cost_{Rickshaw} = 10.56\ PKR/km$$

$$U_{BRT} = -1.40037 - 0.119097\,.\,Time_{BRT}$$

Probability P of choosing one of the modes:

$$P_{Rickshaw} = \frac{e^{U_{Rickshaw}}}{e^{U_{Rickshaw}} + e^{U_{BRT}}}$$

$$P_{BRT} = \frac{e^{U_{BRT}}}{e^{U_{Rickshaw}} + e^{U_{BRT}}}$$

3.2.3.2 Passengers from Private Cars

Utility functions (U) for Private Cars and BRT:

$$U_{Private\ Cars} = -0.00495077\,.\,Cost_{Private\ Cars} + 0.00495077\,.\,Cost_{BRT}$$

$$Cost_{Private\ Cars} = 14.12\ PKR/km$$

$$U_{BRT} = -0.807213 - 0.0837987 \, .Time_{BRT} + 0.0837987 \, .Time_{Private\ Cars}$$

Probability P of choosing one of the modes:

$$P_{Private\ Cars} = \frac{e^{U_{Private\ Cars}}}{e^{U_{Private\ Cars}} + e^{U_{BRT}}}$$

$$P_{BRT} = \frac{e^{U_{BRT}}}{e^{U_{Private\ Cars}} + e^{U_{BRT}}}$$

3.2.3.3 Passengers from Motorcycles

Utility functions (U) for Motorcycles and BRT:

$$U_{Private\ Cars} = -0.0778283 \, .Cost_{Motorcyle} + 0.0778283 \, .Cost_{BRT}$$

$$Cost_{Motorcyle} = 1.91 \; PKR/km$$

$$U_{BRT} = -0.201529 - 0.0916158 \, .Time_{BRT} + 0.0916158 \, .Time_{Motorcyle}$$

Probability P of choosing one of the modes:

$$P_{Motorcyles} = \frac{e^{U_{Motorcyles}}}{e^{U_{Motorcyles}} + e^{U_{BRT}}}$$

$$P_{BRT} = \frac{e^{U_{BRT}}}{e^{U_{Motorcyles}} + e^{U_{BRT}}}$$

3.2.4 Demand data from Transport model

The current transport demand along the proposed BRT corridors is estimated between 347,283 and 501,940 passengers per day depending on the modelled scenarios. It should be noted that the model considers the effects of Green Line, Orange Line and Red line Corridors operation for the transport demand. For all scenarios, it was considered a 0% competition level between the BRT and other existing services in the corridor, due to the activities to be carried out as part of the Bus Industry Restructuring Program.

3.2.4.1 Scenario with FS 15-55 PKR (2km)

Considering the fare structure of 15-55 PKR (2km), the BRT system presents a daily demand of 347,300 passengers. The following table summarizes the composition of the BRT demand according to the modelled modal shift, therefore shows how much of the BRT demand comes from each of the other services type.

Table 3.3: Composition of the BRT demand

Other services	Composition of the BRT demand
Public transport	90.7%

Other services	Composition of the BRT demand
Cars	5.3%
Motorcycles	2.3%
Rickshaw	1.7%

The load profile for the BRT during the peak hour along the city, is presented in the following figure.

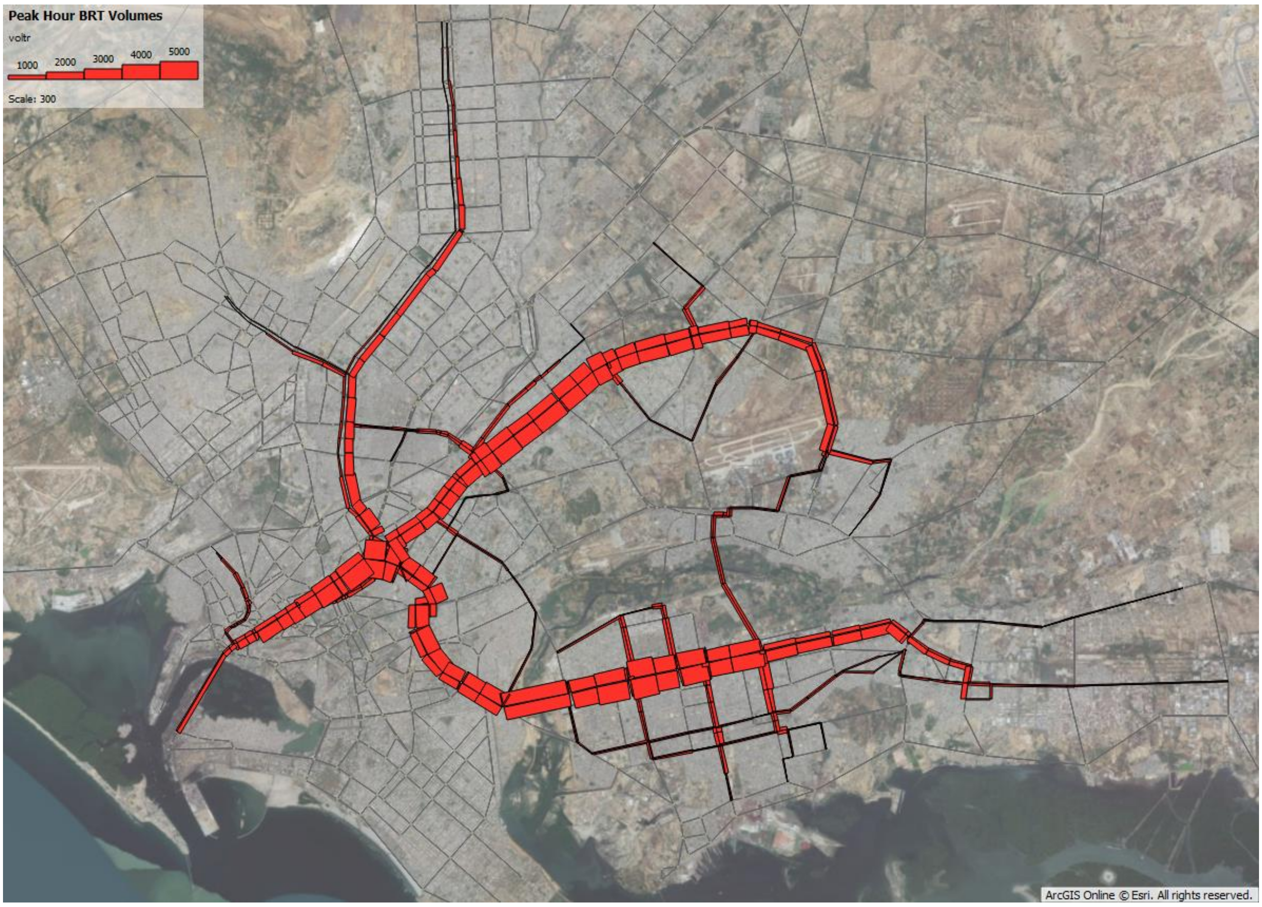


Figure 3.7: Passenger peak hour volumes on BRT services (FS 15-55 PKR – 2km)

The following table summarizes the main outputs of the transport model for all BRT routes

Table 3.4: Transport demand results per route

Route	Critical Load (pass/h)	Journey Time (min)	Length (km)	Boarding (pass/day)
YL Trunk 01	1,178	129	22	56,592
YL Trunk 02 Express	1,830	137	26	71,298
YL Trunk 03 Super	1,546	100	22	45,808
YL Direct 01	437	142	20	37,242
YL Direct 02	755	65	9	37,655
YL Direct 03	283	166	23	52,955
YL Direct 04	1,110	126	13	58,850
YL Direct 05	961	108	11	63,597
YL Direct 06	661	99	13	31,528
YL Feeder 01	207	46	10	10,952

Route	Critical Load (pass/h)	Journey Time (min)	Length (km)	Boarding (pass/day)
YL Feeder 02 A	1,097	37	4	20,485
YL Feeder 02 B	390	54	11	10,630
YL Feeder 03	836	130	12	34,095

It should be noted that the 15-55 PKR (2km) fare structure is considerably higher than the current public transport services fare structure. This has a significant effect especially for trips shorter than 10km, which is the range where most trips occur (near 65% of all trips fall within this range), and where the BRT fare is on average 2 times the current fare.

As the population has a limited financial capacity of absorbing higher fares than the current ones, high BRT fare structures in comparison to the existing services might inhibit some trips, which is the opposite of what the BRT purpose is.

It might also lead to the rise of new affordable informal private transportation to attend lower income population and, if this happens, this would be an unpredicted competition that could potentially affect the BRT operation.

3.2.4.2 Scenario with FS 10-40 PKR (5km)

Considering the fare structure of 10-40 PKR (5km), the BRT system presents a daily demand of 501,900 passengers. The following table summarizes the composition of the BRT demand according to the modelled modal shift, therefore shows how much of the BRT demand comes from each of the other services type.

Table 3.5: Composition of the BRT demand

Other services	Composition of the BRT demand
Public transport	90.7%
Cars	4.1%
Motorcycles	3.4%
Rickshaw	1.8%

The load profile for the BRT during the peak hour along the city is presented in the following figure.

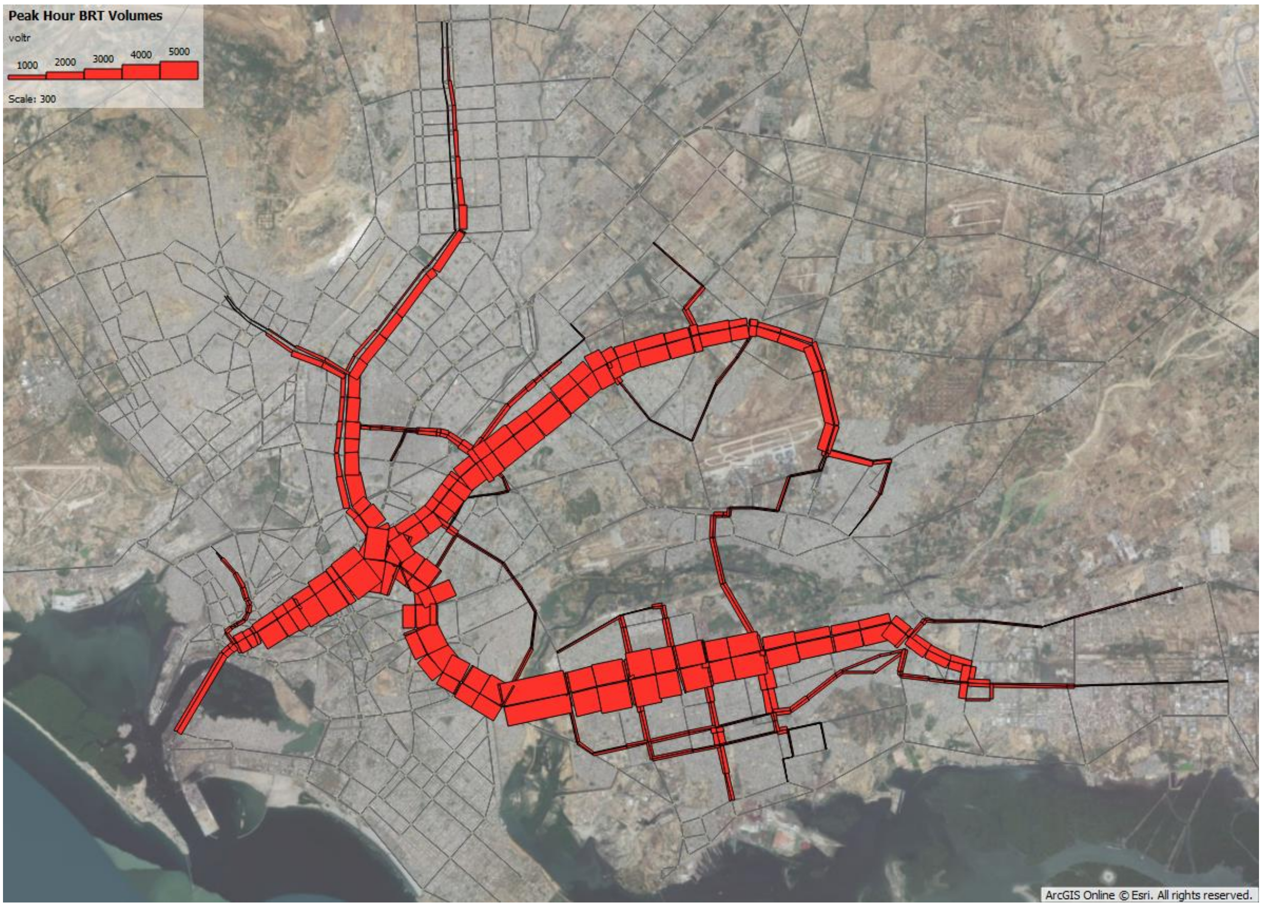


Figure 3.8: Passenger peak hour volumes on BRT services (FS 10-40 PKR – 5km)

The following table summarizes the main outputs of the transport model for all BRT routes

Table 3.6: Transport demand results per route

Route	Critical Load (pass/h)	Journey Time (min)	Length (km)	Boarding (pass/day)
YL Trunk 01	1,692	129	22	90,558
YL Trunk 02 Express	2,585	137	26	119,802
YL Trunk 03 Super	2,555	100	22	75,465
YL Direct 01	747	142	20	62,565
YL Direct 02	1,035	65	9	52,348
YL Direct 03	602	166	23	87,217
YL Direct 04	1,295	126	13	72,330
YL Direct 05	976	108	11	70,873
YL Direct 06	1,134	99	13	53,354
YL Feeder 01	362	46	10	19,260
YL Feeder 02 A	1,690	37	4	35,514
YL Feeder 02 B	800	54	11	23,581
YL Feeder 03	1,049	130	12	40,106

3.2.4.3 Scenario with FS 20-50 PKR (5km)

Considering the fare structure of 20-50 PKR (5km), the BRT system presents a daily demand of 377,400 passengers. The following table summarizes the composition of the BRT demand according to the modelled modal shift, therefore shows how much of the BRT demand comes from each of the other services type.

Table 3.7: Composition of the BRT demand

Other services	Composition of the BRT demand
Public transport	90.4%
Cars	5.2%
Motorcycles	2.8%
Rickshaw	1.6%

The load profile for the BRT during the peak hour along the city is presented in the following figure.

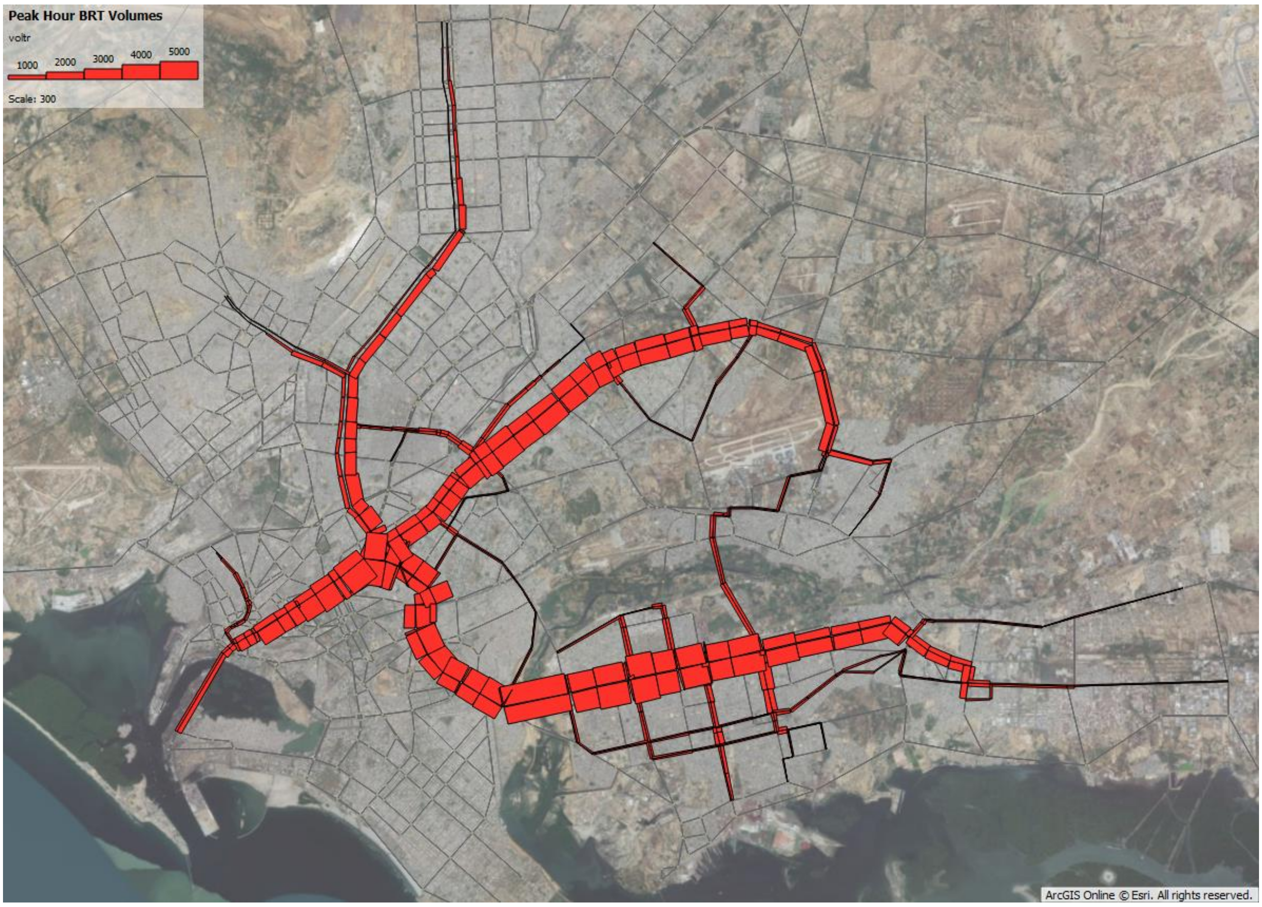


Figure 3.9: Passenger peak hour volumes on BRT services (FS 20-50 PKR – 5km)

The following table summarizes the main outputs of the transport model for all BRT routes

Table 3.8: Transport demand results per route

Route	Critical Load (pass/h)	Journey Time (min)	Length (km)	Boarding (pass/day)
YL Trunk 01	1,357	129	22	69,815
YL Trunk 02 Express	2,211	137	26	97,137
YL Trunk 03 Super	2,409	100	22	69,776
YL Direct 01	495	142	20	44,273
YL Direct 02	869	65	9	39,590
YL Direct 03	394	166	23	58,076
YL Direct 04	1,139	126	13	64,681
YL Direct 05	968	108	11	64,926
YL Direct 06	855	99	13	33,979
YL Feeder 01	278	46	10	15,106
YL Feeder 02 A	1,524	37	4	30,844
YL Feeder 02 B	622	54	11	18,266
YL Feeder 03	961	130	12	33,927

4. BRT Yellow Line Operational Plan

This item presents the premises and calculations for the operational plan definition, followed by a summary of the results for all modelled scenarios.

4.1 Methodology

In order to have a better understanding of the overall process to develop an Operational Plan, the following figure presents, schematically, the steps for designing the operation of a BRT system.

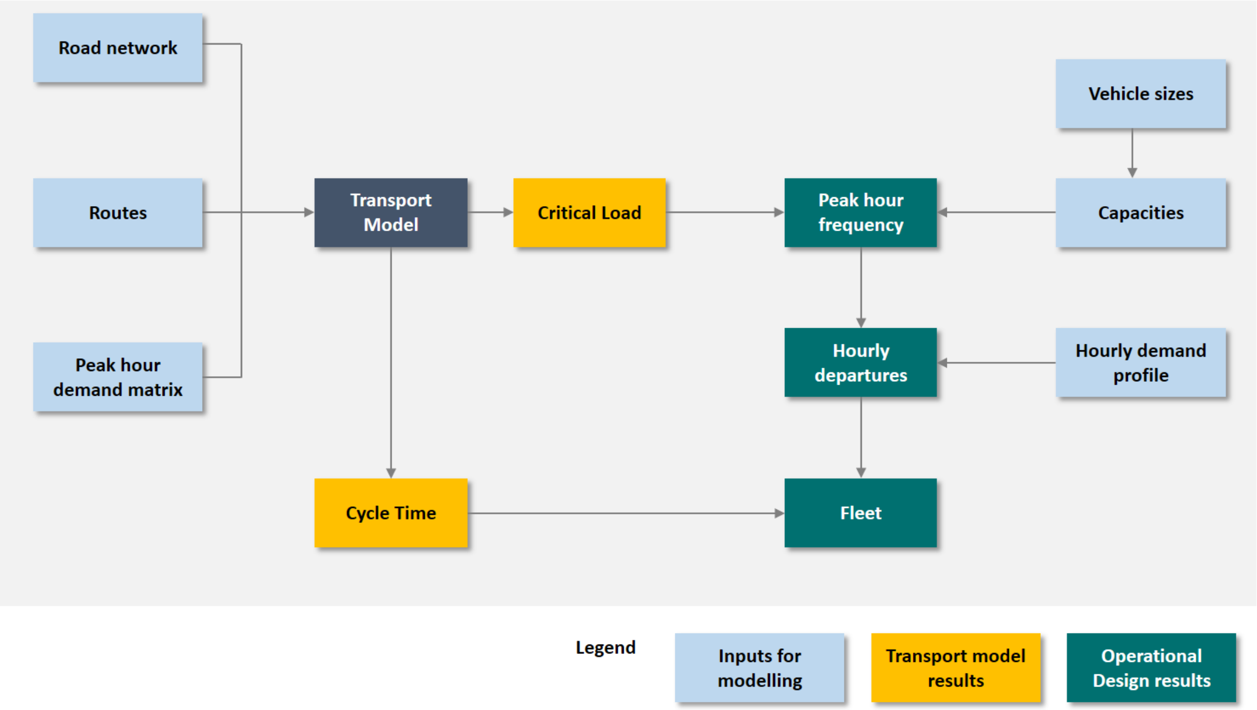


Figure 4.1: Methodology for designing Operational Plan

The minimum frequency for a route on peak hour is function of its critical load, the nominal capacity of the vehicle given to this route, and function of the maximum design occupancy, as presented below:

$$Frequency\ [vehicles/hour] = \frac{Critical\ Load\ [pax/hour]}{Capacity\ [pax/vehicle] * Occupancy\ Factor}$$

For low demand services, it is favorable to assign smaller buses, so that the headway will not be too high, what would cause a negative impact for the user.

The Occupancy Factor was defined as 95%, which is the same as saying that on the peak hour, the buses will be almost completely occupied not during the whole extension of the route, but only on the critical section. Regarding capacities, the following table presents the nominal capacity of each vehicle type analyzed for the BRT system in Karachi.

Table 4.1: Nominal capacities for potential vehicles on Karachi BRT system

Vehicle Size	Nominal vehicle capacity
9 m	50 passengers
12 m	75 passengers
18 m	125 passengers

For hourly frequency, it is necessary to have critical load per hour. As the complete modelling process relies on dimensioning demand and supply only for the peak hour, this information comes from processing the surveys, specifically from the Frequency and Occupancy survey.

Following international manuals for BRT operations, the dimensioning of the fleet considers the following criteria:

$$F_0 = \frac{CT}{H}$$

So that:

- F_0 = Total fleet;
- CT = Cycle time, in minutes;
- H = Headway, in minutes.

4.1.1 Assumptions for fleet sizing

For the development of the Operational Plan it was required not only the methodology and the data from the model, but also some specific assumptions presented in the following table.

Table 4.2: Operational design assumptions

Description	Value
Optimum occupancy per vehicle	95%
Reserve fleet	8%
Layover	10 min
Maximum headway per route	15 min
Dead km	10%

4.2 Modelled scenarios results

According to the assumptions for fleet sizing and the demand data from Transport Model, the operational design per route was defined for all modelled scenarios and is presented in this item.

The following table summarizes the fleet compositions for each route for all the fare structure scenarios evaluated, according to the premises explained in item 3.1.

Table 4.3: Fleet Composition

Route	Fleet Composition	
	FC 1	FC 2
Trunk Service 01	18m	18m
Trunk Service 02 (Express)	18m	18m
Trunk Service 03 (Super)	18m	18m
Direct Service 01	12m	12m
Direct Service 02	12m	12m
Direct Service 03	12m	12m
Direct Service 04	12m	12m
Direct Service 05	12m	12m
Direct Service 06	12m	12m
Feeder Service 01	9m	12m
Feeder Service 02 A	9m	12m
Feeder Service 02 B	9m	12m
Feeder Service 03	9m	12m

The following table details the BRT Stations for each Yellow Line service.

Table 4.4: BRT stations for Yellow Line Services

BRT line	Station ID	YL Trunk 01	YL Trunk 02 Express	YL Trunk 03 Super	YL Direct 01	YL Direct 02	YL Direct 03	YL Direct 04	YL Direct 05	YL Direct 06	YL Feeder 01	YL Feeder 02 A	YL Feeder 02 B	YL Feeder 03	No. Services Stopping at Station
Common Corridor	CC-08		*												1
	CC-07		*												1
	CC-06		*												1
	CC-05		*												1
	CC-04		*												1
	CC-03		*												1
	CC-02		*												1
	CC-01	*	*	*	*										4
Yellow Line Corridor	RL-00 = YL-01	*	*		*										3
	YL-02	*			*										2
	YL-03	*	*		*										3
	YL-04	*	*		*										3
	YL-05	*			*										2
	YL-06	*			*										2
	YL-07	*			*										2
	YL-08	*			*										2
	YL-09	*	*		*										3
	YL-10	*			*										2
	YL-11	*	*		*		*								4
	YL-12	*	*			*	*								4
	YL-13	*				*	*								3
	YL-14	*				*	*								3
	YL-15	*	*	*			*	*							5
	YL-16	*					*	*	*	*					5
	YL-17	*					*	*	*	*					5
	YL-18	*					*		*	*					4
	YL-19	*	*	*			*		*	*				*	7
	YL-20	*												*	2
	YL-21	*													1
	YL-22	*													1
	YL-23	*													1
	YL-24	*	*	*							*	*	*		6

4.2.1.1 Scenario with FS 15-55 PKR (2km)

The following table summarizes the main results from the operational plan per route, for all evaluated fleet compositions.

Table 4.5: Operational plan results for FC 1

Route Name	Vehicle Size	Length (km)	Cycle time (min)	Headway (min)	Peak load (pass/h)	Daily boarding (pass/day)	Travelled km (km/day)	Operational Fleet (#bus)
YL Trunk 01	18m	22	129	6	1,178	56,592	5,978	22
YL Trunk 02 Express	18m	26	137	4	1,830	71,298	10,886	37
YL Trunk 03 Super	18m	22	100	4	1,546	45,808	7,931	24
YL Direct 01	12m	20	142	9	437	37,242	3,613	17
YL Direct 02	12m	9	65	5	755	37,655	2,639	12
YL Direct 03	12m	23	166	15	283	52,955	2,899	12
YL Direct 04	12m	13	126	4	1,110	58,850	5,613	34
YL Direct 05	12m	11	108	4	961	63,597	4,060	26
YL Direct 06	12m	13	99	6	661	31,528	3,303	17
YL Feeder 01	9m	10	46	12	207	10,952	1,446	4
YL Feeder 02 A	9m	4	37	3	1,097	20,485	2,512	15
YL Feeder 02 B	9m	11	54	7	390	10,630	2,537	9
YL Feeder 03	9m	12	130	3	836	34,095	5,726	40
Total + 8% Reserve Fleet								**292**

Table 4.6: Operational plan results for FC 2

Route Name	Vehicle Size	Length (km)	Cycle time (min)	Headway (min)	Peak load (pass/h)	Daily boarding (pass/day)	Travelled km (km/day)	Operational Fleet (#bus)
YL Trunk 01	18m	22	129	6	1,178	56,592	5,978	22
YL Trunk 02 Express	18m	26	137	4	1,830	71,298	10,886	37
YL Trunk 03 Super	18m	22	100	4	1,546	45,808	7,931	24
YL Direct 01	12m	20	142	9	437	37,242	3,613	17
YL Direct 02	12m	9	65	5	755	37,655	2,639	12
YL Direct 03	12m	23	166	15	283	52,955	2,899	12
YL Direct 04	12m	13	126	4	1,110	58,850	5,613	34
YL Direct 05	12m	11	108	4	961	63,597	4,060	26
YL Direct 06	12m	13	99	6	661	31,528	3,303	17
YL Feeder 01	12m	10	46	15	207	10,952	1,304	4
YL Feeder 02 A	12m	4	37	4	1,097	20,485	1,718	10
YL Feeder 02 B	12m	11	54	10	390	10,630	1,880	6
YL Feeder 03	12m	12	130	5	836	34,095	3,949	27
Total + 8% Reserve Fleet								**269**

The following figure and table show the maximum total frequency of the combined BRT services at peak hour by transit way segment per direction on the Yellow Line Corridor and the Common Corridor considering only the presented services.

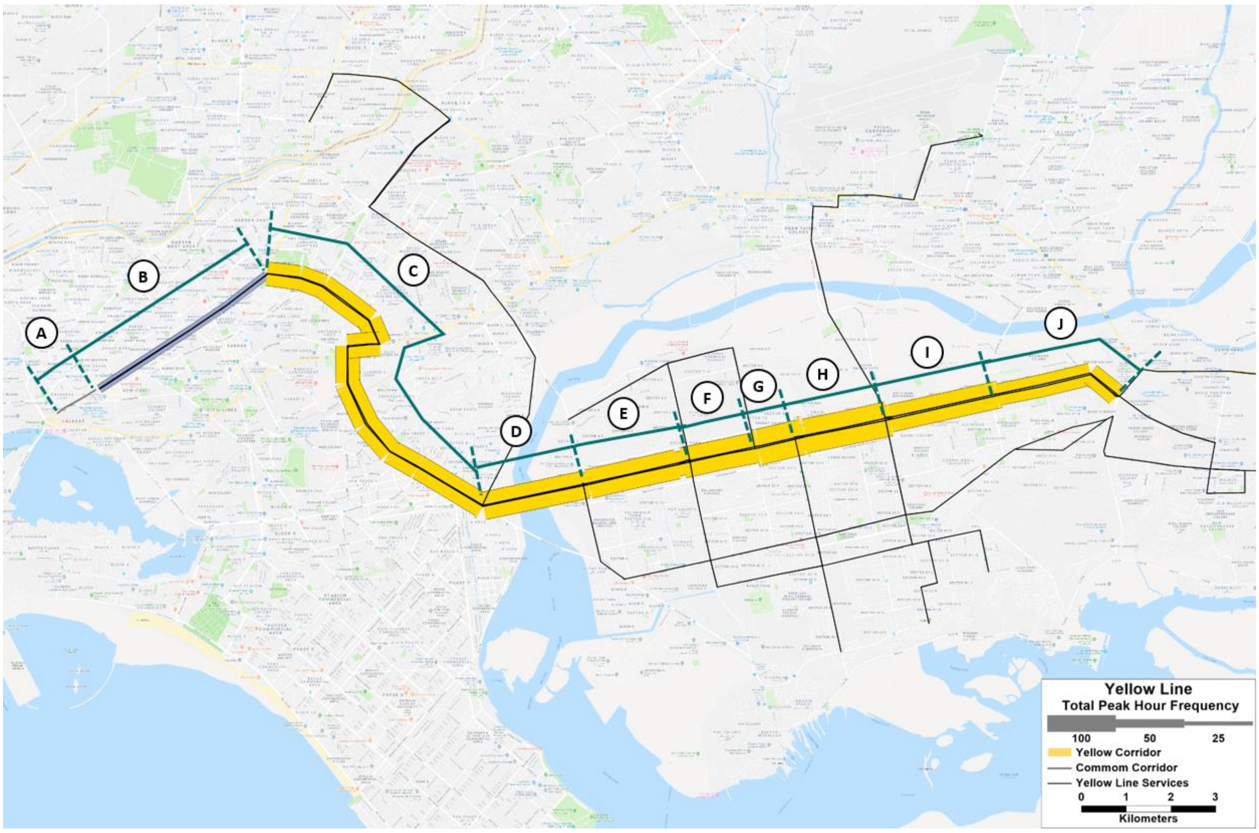


Figure 4.2: Total peak hour frequency per direction on each transit way segment

Table 4.7: Peak hour frequency per direction per transit way segment

Transit way segment	Total peak hour frequency per direction per transit way segment	
	FC 1	FC 2
A	0	0
B	16	16
C	47	47
D	51	51
E	55	55
F	60	60
G	74	74
H	68	68
I	58	52
J	40	40

The following table summarizes the critical frequency of buses per hour at each stations of the Common and Yellow Line corridor considering the evaluated fleet compositions with only the presented services.

Table 4.8: Critical frequency

BRT line	Station ID	Critical Frequency (bus/h)	
		FC 1	**FC 2**
Common Corridor	CC-08	32	32
	CC-07	32	32
	CC-06	32	32
	CC-05	32	32
	CC-04	32	32
	CC-03	32	32
	CC-02	32	32
	CC-01	94	94
Yellow Line Corridor	YL-01 (=RL-00)	66	66
	YL-02	34	34
	YL-03	66	66
	YL-04	66	66
	YL-05	34	34
	YL-06	34	34
	YL-07	34	34
	YL-08	34	34
	YL-09	66	66
	YL-10	34	34
	YL-11	74	74
	YL-12	82	82
	YL-13	50	50
	YL-14	50	50
	YL-15	120	120
	YL-16	108	108
	YL-17	108	108
	YL-18	76	76
	YL-19	172	160
	YL-20	56	44
	YL-21	20	20
	YL-22	20	20
	YL-23	20	20
	YL-24	138	120

In order to evaluate the passenger flow on the system, an additional analysis was performed to determine the interchange passenger flow on each BRT station, regarding three flow categories:

- Entry: Total number of users on peak hour that enter the BRT station walking or arriving at the station by some transport mode other than the BRT (such as Coaches, Minibus, Rickshaw, etc);

- Exit: Total number of users on peak hour that exit the BRT station walking or by some transport mode other than the BRT (such as Coaches, Minibus, Rickshaw, etc);
- Internal transfer: Total number of users on peak hour that board a BRT system service coming from another BRT system service, that is, interchanges between one BRT route to another.

The following table and the following figures present the peak hour and daily passenger flow in the BRT stations. For the stations of the Common Corridor it is also been considered on the calculation the passenger flow of the Red Line and Green Line services, and, for the station YL-01 (=RL-00) it is also been considered the Red Line services.

Table 4.9: Passenger flow in the BRT stations

BRT Station	Passenger flow on peak hour				Daily passenger flow (pax/day)
	Entry (pax/h)	Exit (pax/h)	Internal transfer (pax/h)	Total (pax/h)	
CC-08	177	1,059	40	1,275	16,454
CC-07	86	474	290	850	10,960
CC-06	174	348	0	523	6,743
CC-05	127	140	1,134	1,401	18,069
CC-04	516	432	380	1,329	17,138
CC-03	247	271	90	608	7,849
CC-02	388	278	0	666	8,594
CC-01	777	631	6,714	8,122	104,775
YL-01 (=RL-00)	323	176	240	739	9,534
YL-02	57	62	0	119	1,533
YL-03	129	129	30	289	3,725
YL-04	157	201	7	365	4,712
YL-05	236	203	0	439	5,662
YL-06	135	236	1	372	4,800
YL-07	102	227	0	330	4,257
YL-08	175	486	0	660	8,518
YL-09	306	607	346	1,259	16,244
YL-10	473	672	0	1,146	14,784
YL-11	277	757	701	1,735	22,376
YL-12	232	1,041	302	1,576	20,325
YL-13	209	621	259	1,089	14,045
YL-14	297	265	0	563	7,264
YL-15	471	397	2,762	3,630	46,833
YL-16	211	298	1,304	1,814	23,399
YL-17	529	305	1,064	1,898	24,479
YL-18	202	147	542	891	11,497
YL-19	518	227	2,592	3,337	43,047
YL-20	106	187	206	500	6,450
YL-21	70	83	0	153	1,970
YL-22	167	151	0	318	4,107
YL-23	201	77	0	278	3,587
YL-24	548	152	2,905	3,605	46,502

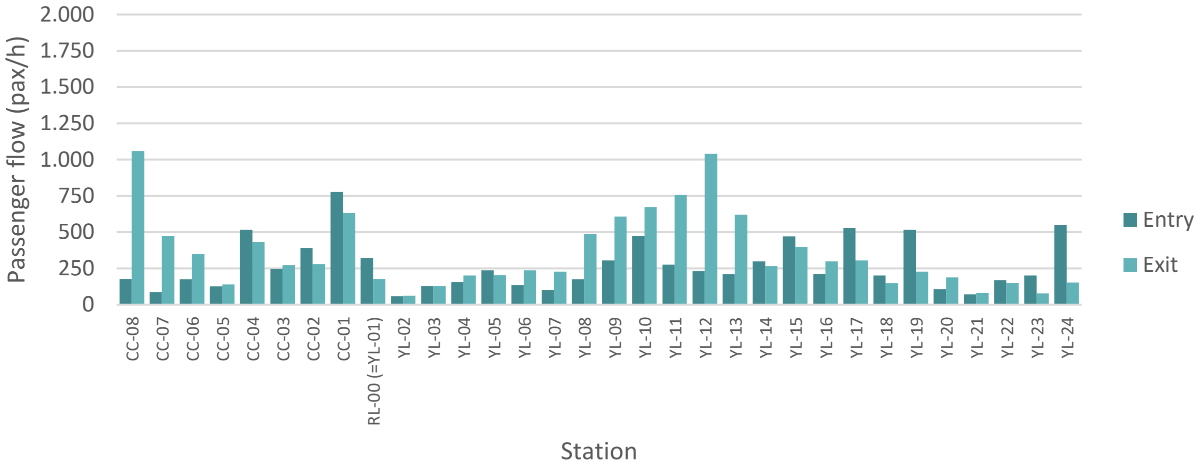


Figure 4.3: Entry and exit of passengers in the BRT stations on peak hour

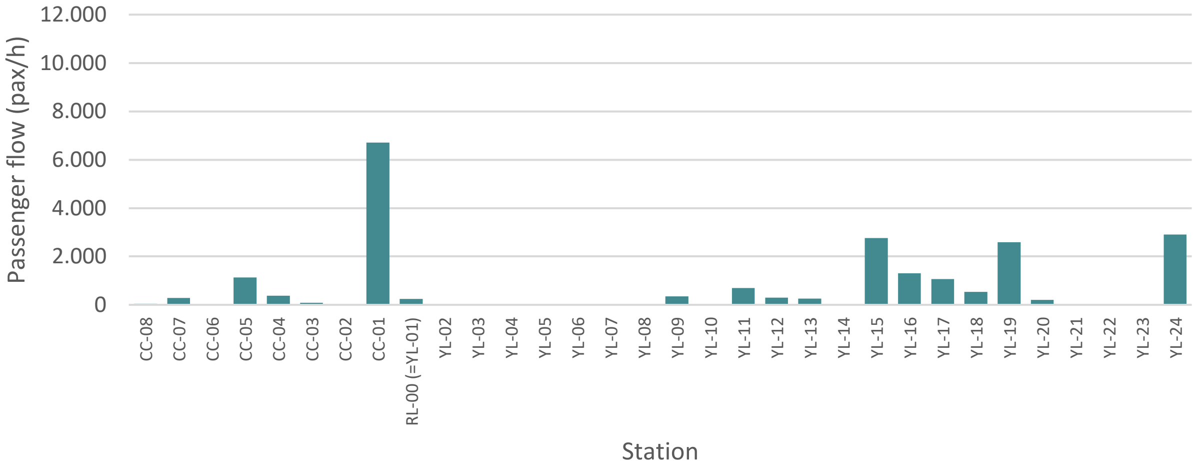


Figure 4.4: Internal transfer of passengers inside the BRT stations on peak hour

4.2.1.2 Scenario with FS 10-40 PKR (5km)

The following table summarizes the main results from the operational plan per route, for all evaluated fleet compositions.

Table 4.10: Operational plan results for FC 1

Route Name	Vehicle Size	Length (km)	Cycle time (min)	Headway (min)	Peak load (pass/h)	Daily boarding (pass/day)	Travelled km (km/day)	Operational Fleet (#bus)
YL Trunk 01	18m	22	129	4	1,692	90,558	8,502	33
YL Trunk 02 Express	18m	26	137	3	2,585	119,802	15,021	51
YL Trunk 03 Super	18m	22	100	3	2,555	75,465	12,671	37
YL Direct 01	12m	20	142	5	747	62,565	5,580	27
YL Direct 02	12m	9	65	4	1,035	52,348	3,476	17
YL Direct 03	12m	23	166	7	602	87,217	5,527	25
YL Direct 04	12m	13	126	3	1,295	72,330	6,553	40
YL Direct 05	12m	11	108	4	976	70,873	4,172	26
YL Direct 06	12m	13	99	4	1,134	53,354	5,609	27
YL Feeder 01	9m	10	46	8	362	19,260	2,220	7
YL Feeder 02 A	9m	4	37	2	1,690	35,514	3,858	23
YL Feeder 02 B	9m	11	54	4	800	23,581	5,052	16
YL Feeder 03	9m	12	130	3	1,049	40,106	7,158	50
							Total + 8% Reserve Fleet	**410**

Table 4.11: Operational plan results for FC 2

Route Name	Vehicle Size	Length (km)	Cycle time (min)	Headway (min)	Peak load (pass/h)	Daily boarding (pass/day)	Travelled km (km/day)	Operational Fleet (#bus)
YL Trunk 01	18m	22	129	4	1,692	90,558	8,502	33
YL Trunk 02 Express	18m	26	137	3	2,585	119,802	15,021	51
YL Trunk 03 Super	18m	22	100	3	2,555	75,465	12,671	37
YL Direct 01	12m	20	142	5	747	62,565	5,580	27
YL Direct 02	12m	9	65	4	1,035	52,348	3,476	17
YL Direct 03	12m	23	166	7	602	87,217	5,527	25
YL Direct 04	12m	13	126	3	1,295	72,330	6,553	40
YL Direct 05	12m	11	108	4	976	70,873	4,172	26
YL Direct 06	12m	13	99	4	1,134	53,354	5,609	27
YL Feeder 01	12m	10	46	10	362	19,260	1,589	5
YL Feeder 02 A	12m	4	37	3	1,690	35,514	2,611	15
YL Feeder 02 B	12m	11	54	5	800	23,581	3,443	11
YL Feeder 03	12m	12	130	4	1,049	40,106	4,838	33
							Total + 8% Reserve Fleet	**376**

The following figure and table show the maximum total frequency of the combined BRT services at peak hour by transit way segment per direction on the Yellow Line Corridor and the Common Corridor considering only the presented services.

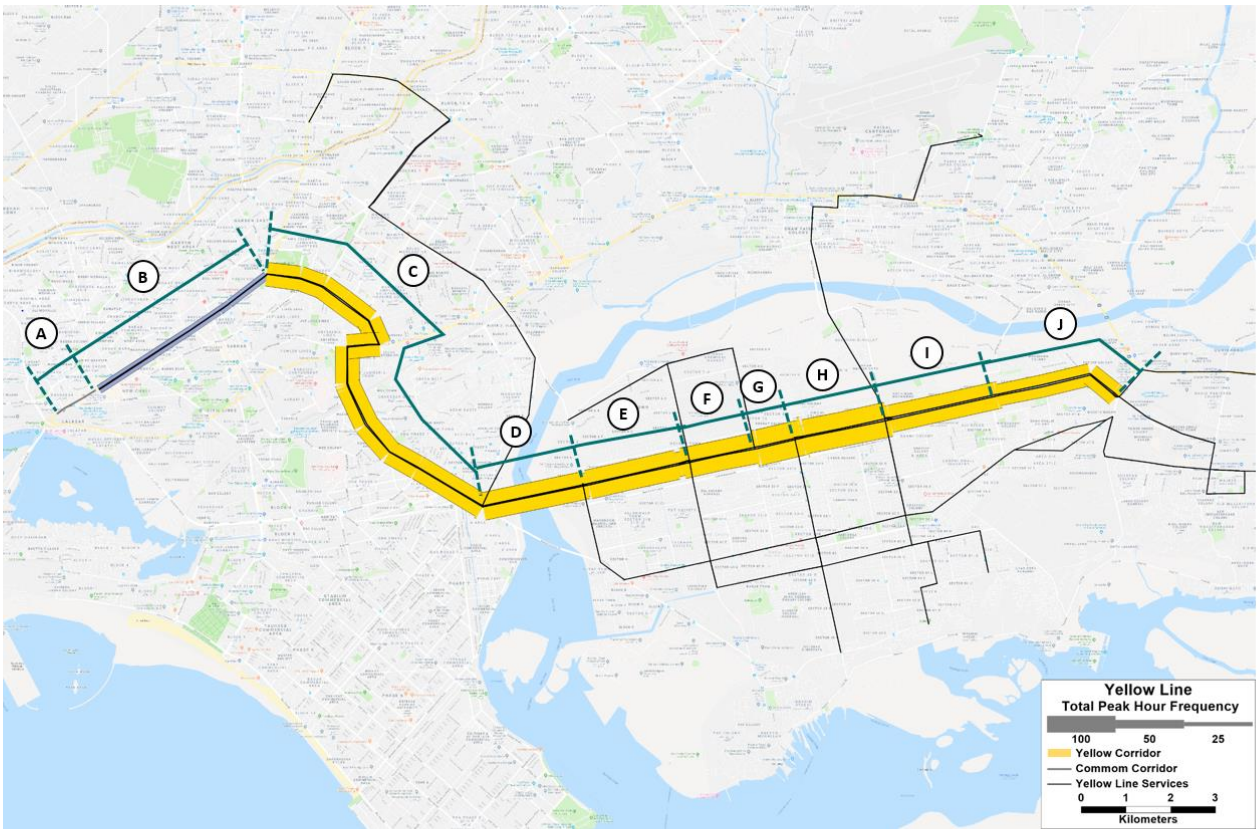


Figure 4.5: Total peak hour frequency per direction on each transit way segment

Table 4.12: Peak hour frequency per direction per transit way segment

Transit way segment	Total peak hour frequency per direction per transit way segment	
	FC 1	**FC 2**
A	0	0
B	22	22
C	70	70
D	79	79
E	83	83
F	87	87
G	101	101
H	98	98
I	82	74
J	59	59

The following table summarizes the critical frequency of buses per hour at each stations of the Common and Yellow Line corridor considering the evaluated fleet compositions with only the presented services.

Table 4.13: Critical frequency

BRT line	Station ID	Critical Frequency (bus/h)	
		FC 1	FC 2
Common Corridor	CC-08	44	44
	CC-07	44	44
	CC-06	44	44
	CC-05	44	44
	CC-04	44	44
	CC-03	44	44
	CC-02	44	44
	CC-01	140	140
Yellow Line Corridor	YL-01 (=RL-00)	96	96
	YL-02	52	52
	YL-03	96	96
	YL-04	96	96
	YL-05	52	52
	YL-06	52	52
	YL-07	52	52
	YL-08	52	52
	YL-09	96	96
	YL-10	52	52
	YL-11	114	114
	YL-12	122	122
	YL-13	78	78
	YL-14	78	78
	YL-15	174	174
	YL-16	146	146
	YL-17	146	146
	YL-18	108	108
	YL-19	242	226
	YL-20	76	60
	YL-21	30	30
	YL-22	30	30
	YL-23	30	30
	YL-24	206	178

The following table and the following figures present the peak hour and daily passenger flow in the BRT stations. For the stations of the Common Corridor it is also been considered on the calculation the passenger flow of the Red Line and Green Line services, and, for the station YL-01 (=RL-00) it is also been considered the Red Line services.

Table 4.14: Passenger flow in the BRT stations

BRT Station	Passenger flow on peak hour				Daily passenger flow (pax/day)
	Entry (pax/h)	Exit (pax/h)	Internal transfer (pax/h)	Total (pax/h)	
CC-08	419	1,802	94	2,315	29,864
CC-07	243	762	599	1,604	20,692
CC-06	243	573	1	818	10,548
CC-05	196	200	2,338	2,734	35,268
CC-04	774	584	698	2,056	26,518
CC-03	451	404	163	1,019	13,140
CC-02	601	463	0	1,064	13,722
CC-01	1,193	827	11,830	13,850	178,665
YL-01 (=RL-00)	433	234	309	975	12,583
YL-02	105	115	0	221	2,845
YL-03	230	226	96	552	7,118
YL-04	264	306	11	582	7,504
YL-05	385	306	1	691	8,918
YL-06	218	327	0	545	7,026
YL-07	168	370	0	538	6,936
YL-08	328	772	0	1,100	14,190
YL-09	592	925	458	1,975	25,477
YL-10	847	964	1	1,812	23,377
YL-11	535	981	1,409	2,925	37,732
YL-12	453	1,442	822	2,717	35,047
YL-13	340	788	433	1,561	20,138
YL-14	436	373	0	809	10,433
YL-15	612	474	3,918	5,005	64,561
YL-16	280	397	1,359	2,036	26,261
YL-17	710	495	2,086	3,290	42,446
YL-18	226	194	445	865	11,153
YL-19	487	369	4,190	5,046	65,096
YL-20	143	277	657	1,076	13,885
YL-21	93	225	0	317	4,096
YL-22	281	250	0	530	6,842
YL-23	353	141	1	495	6,385
YL-24	1,031	324	5,333	6,687	86,264

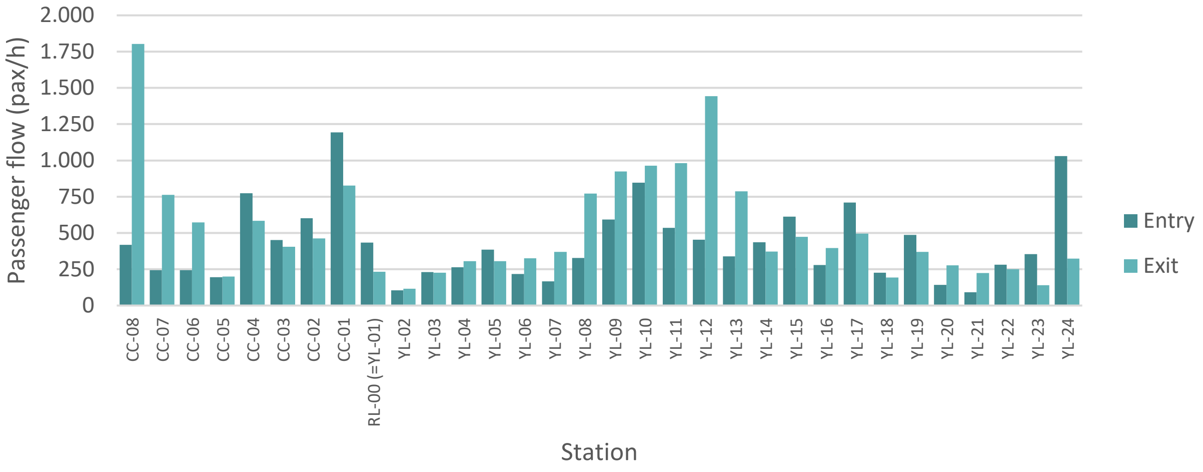


Figure 4.6: Entry and exit of passengers in the BRT stations on peak hour

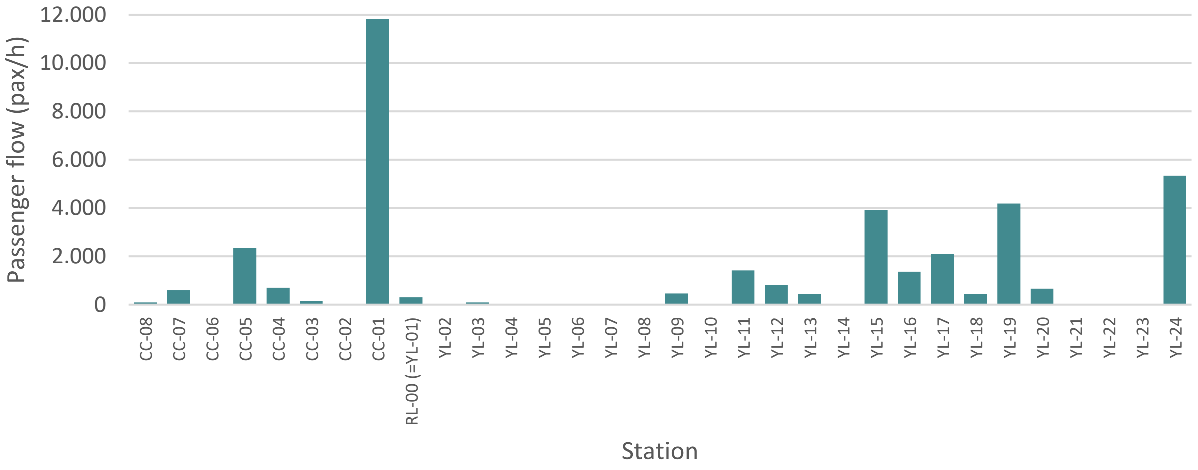


Figure 4.7: Internal transfer of passengers inside the BRT stations on peak hour

4.2.1.3 Scenario with FS 20-50 PKR (5km)

The following table summarizes the main results from the operational plan per route, for all evaluated fleet compositions.

Table 4.15: Operational plan results for FC 1

Route Name	Vehicle Size	Length (km)	Cycle time (min)	Headway (min)	Peak load (pass/h)	Daily boarding (pass/day)	Travelled km (km/day)	Operational Fleet (#bus)
YL Trunk 01	18m	22	129	5	1,357	69,815	6,731	26
YL Trunk 02 Express	18m	26	137	3	2,211	97,137	12,875	44
YL Trunk 03 Super	18m	22	100	3	2,409	69,776	12,140	35

Route Name	Vehicle Size	Length (km)	Cycle time (min)	Headway (min)	Peak load (pass/h)	Daily boarding (pass/day)	Travelled km (km/day)	Operational Fleet (#bus)
YL Direct 01	12m	20	142	9	495	44,273	3,894	17
YL Direct 02	12m	9	65	5	869	39,590	2,959	15
YL Direct 03	12m	23	166	10	394	58,076	3,760	17
YL Direct 04	12m	13	126	4	1,139	64,681	5,747	34
YL Direct 05	12m	11	108	4	968	64,926	4,060	26
YL Direct 06	12m	13	99	5	855	33,979	4,299	20
YL Feeder 01	9m	10	46	10	278	15,106	1,711	5
YL Feeder 02 A	9m	4	37	2	1,524	30,844	3,503	21
YL Feeder 02 B	9m	11	54	4	622	18,266	4,055	13
YL Feeder 03	9m	12	130	3	961	33,927	6,763	46
Total + 8% Reserve Fleet								**346**

Table 4.16: Operational plan results for FC 2

Route Name	Vehicle Size	Length (km)	Cycle time (min)	Headway (min)	Peak load (pass/h)	Daily boarding (pass/day)	Travelled km (km/day)	Operational Fleet (#bus)
YL Trunk 01	18m	22	129	5	1,357	69,815	6,731	26
YL Trunk 02 Express	18m	26	137	3	2,211	97,137	12,875	44
YL Trunk 03 Super	18m	22	100	3	2,409	69,776	12,140	35
YL Direct 01	12m	20	142	9	495	44,273	3,894	17
YL Direct 02	12m	9	65	5	869	39,590	2,959	15
YL Direct 03	12m	23	166	10	394	58,076	3,760	17
YL Direct 04	12m	13	126	4	1,139	64,681	5,747	34
YL Direct 05	12m	11	108	4	968	64,926	4,060	26
YL Direct 06	12m	13	99	5	855	33,979	4,299	20
YL Feeder 01	12m	10	46	15	278	15,106	1,304	4
YL Feeder 02 A	12m	4	37	3	1,524	30,844	2,363	14
YL Feeder 02 B	12m	11	54	7	622	18,266	2,764	9
YL Feeder 03	12m	12	130	4	961	33,927	4,468	31
Total + 8% Reserve Fleet								**316**

The following figure and table show the maximum total frequency of the combined BRT services at peak hour by transit way segment per direction on the Yellow Line Corridor and the Common Corridor considering only the presented services.

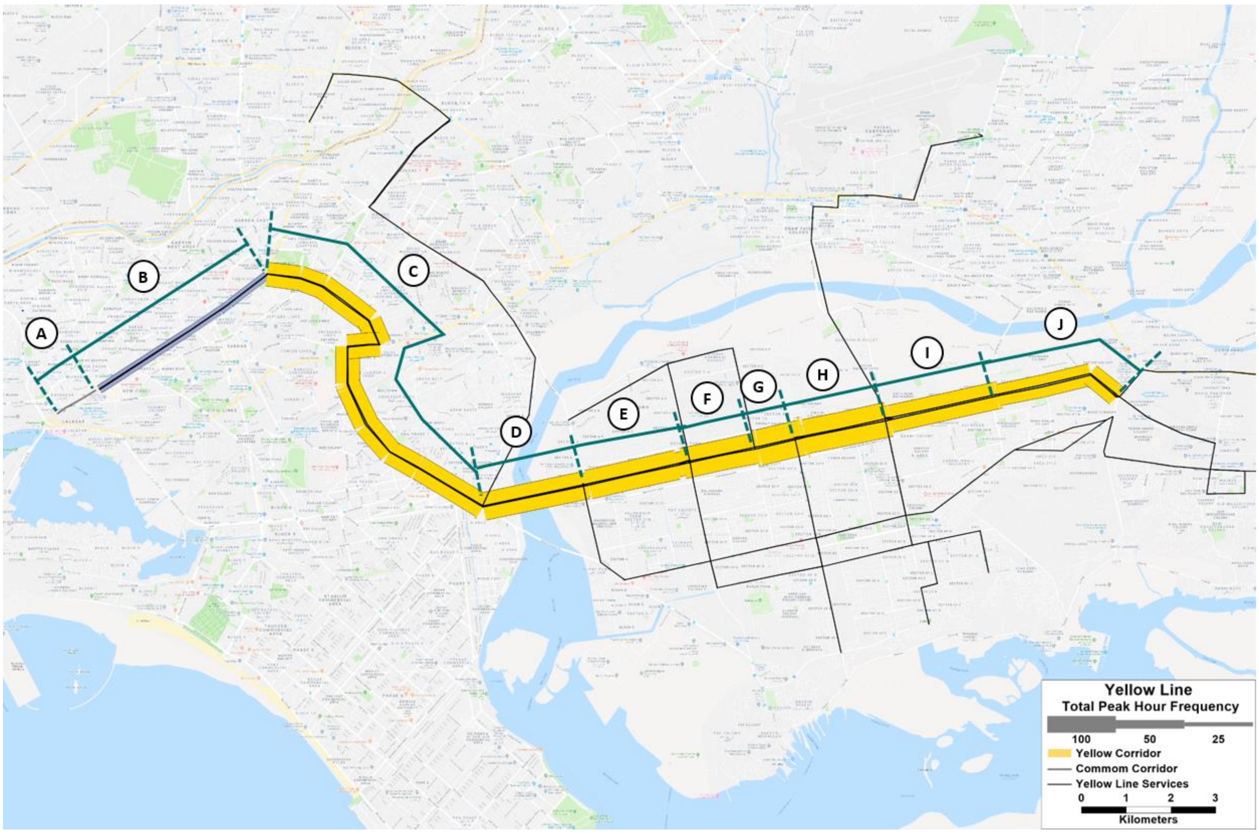


Figure 4.8: Total peak hour frequency per direction on each transit way segment

Table 4.17: Peak hour frequency per direction per transit way segment

Transit way segment	Total peak hour frequency per direction per transit way segment	
	FC 1	FC 2
A	0	0
B	19	19
C	59	59
D	65	65
E	71	71
F	74	74
G	88	88
H	84	84
I	73	66
J	52	52

The following table summarizes the critical frequency of buses per hour at each stations of the Common and Yellow Line corridor considering the evaluated fleet compositions with only the presented services.

Table 4.18: Critical frequency

BRT line	Station ID	Critical Frequency (bus/h)	
		FC 1	FC 2
Common Corridor	CC-08	38	38
	CC-07	38	38
	CC-06	38	38
	CC-05	38	38
	CC-04	38	38
	CC-03	38	38
	CC-02	38	38
	CC-01	118	118
Yellow Line Corridor	YL-01 (=RL-00)	76	76
	YL-02	38	38
	YL-03	76	76
	YL-04	76	76
	YL-05	38	38
	YL-06	38	38
	YL-07	38	38
	YL-08	38	38
	YL-09	76	76
	YL-10	38	38
	YL-11	88	88
	YL-12	100	100
	YL-13	62	62
	YL-14	62	62
	YL-15	148	148
	YL-16	120	120
	YL-17	120	120
	YL-18	88	88
	YL-19	210	196
	YL-20	66	52
	YL-21	24	24
	YL-22	24	24
	YL-23	24	24
	YL-24	182	156

The following table and the following figures present the peak hour and daily passenger flow in the BRT stations. For the stations of the Common Corridor it is also been considered on the calculation the passenger flow of the Red Line and Green Line services, and, for the station YL-01 (=RL-00) it is also been considered the Red Line services.

Table 4.19: Passenger flow in the BRT stations

BRT Station	Passenger flow on peak hour				Daily passenger flow (pax/day)
	Entry (pax/h)	Exit (pax/h)	Internal transfer (pax/h)	Total (pax/h)	
CC-08	212	1,278	64	1,554	20,049
CC-07	122	539	245	906	11,684
CC-06	158	421	0	579	7,464
CC-05	120	148	1,593	1,861	24,004
CC-04	481	430	556	1,467	18,924
CC-03	269	290	113	671	8,656
CC-02	400	268	0	668	8,619
CC-01	765	501	10,038	11,304	145,820
YL-01 (=RL-00)	322	157	291	770	9,935
YL-02	82	84	0	166	2,140
YL-03	175	167	48	390	5,036
YL-04	178	229	4	412	5,316
YL-05	260	222	0	482	6,214
YL-06	157	265	0	422	5,449
YL-07	126	280	0	406	5,238
YL-08	232	595	0	827	10,669
YL-09	428	751	392	1,571	20,262
YL-10	600	754	0	1,354	17,465
YL-11	363	770	1,052	2,185	28,182
YL-12	301	1,086	580	1,967	25,371
YL-13	246	616	334	1,196	15,427
YL-14	356	267	0	623	8,034
YL-15	481	372	3,578	4,430	57,153
YL-16	205	307	1,370	1,882	24,280
YL-17	472	329	1,648	2,449	31,595
YL-18	154	139	370	663	8,549
YL-19	353	269	3,773	4,395	56,692
YL-20	102	214	608	924	11,913
YL-21	69	152	1	222	2,863
YL-22	205	177	0	383	4,934
YL-23	249	107	0	356	4,594
YL-24	715	232	4,708	5,655	72,953

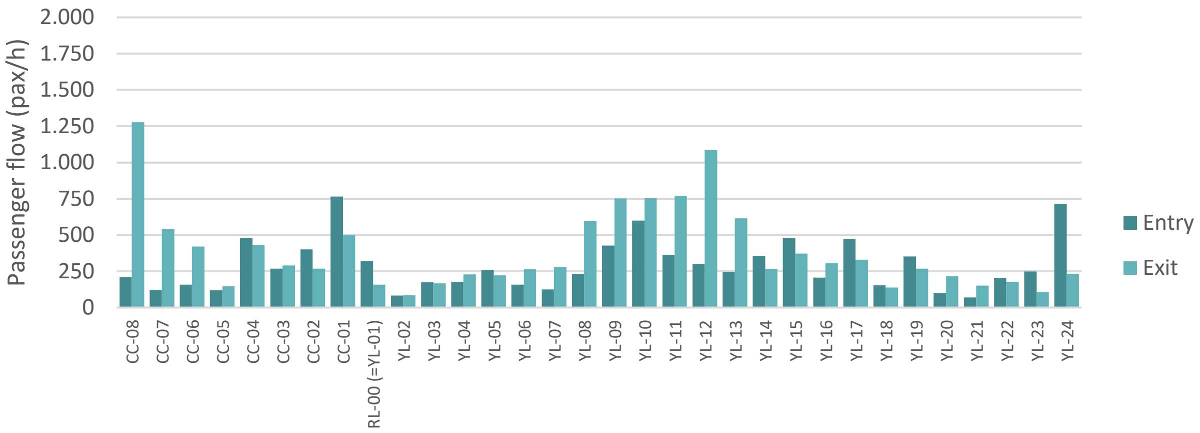


Figure 4.9: Entry and exit of passengers in the BRT stations on peak hour

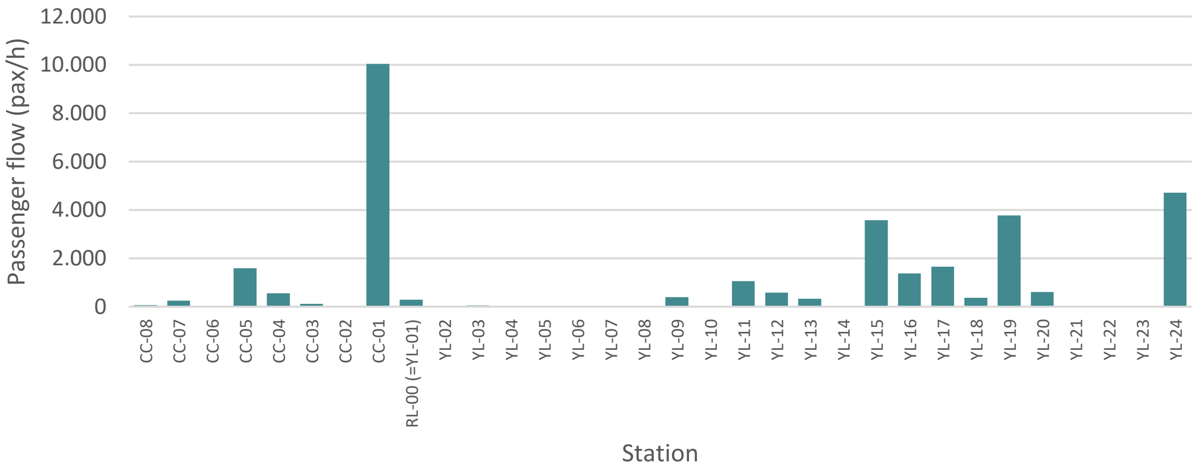


Figure 4.10: Internal transfer of passengers inside the BRT stations on peak hour

5. Maintenance Plan for Fleet

The maintenance plan for the BRT fleet aims to ensure maximum vehicle availability, consistent with international standards, during the peak periods, moment in which the system needs a higher number of buses operating the services. If a big number of vehicles are unavailable, the operation will occur below the minimum expected level of service. The services will operate with lower frequencies and the buses will need to carry more passengers than the capacity.

The maintenance of the BRT fleet includes mechanical maintenance, cleaning, conservation and monitoring procedures under the supervision of the bus supplier, as detailed in the following items.

5.1 Maintenance Responsibility

In the first two years of the BRT operations, the supplier of the buses will provide vehicle maintenance supervision. This will occur because of the inexperience of the Operator Company with the new vehicles. During this period, the bus supplier will be responsible for overseeing all scheduled maintenance activities of the vehicles. Thus, the bus supplier must implement a Maintenance Plan according to the best recommendations for the new buses, such as the maintenance checklist and the schedule of preventive maintenances. Vehicle and component manufacturer's manuals are an important part of the vehicle maintenance plan as they define specific maintenance interval and provide the required critical information.

The BRT Operator Company will be providing the maintenance staff, who will be advised by the Supplier's maintenance supervisor in carrying out the routine maintenance activities. The bus supplier shall also provide all replacement parts for all maintenance items caused through normal wear and tear as well as scheduled replacements. Conversely, the BRT Operator Company will be responsible for all materials and associated costs for repair actions caused by road collisions or other unscheduled incidents.

5.2 Maintenance Training

The bus supplier shall deliver a maintenance-training program that will properly prepare the BRT Operator Company to independently maintain its vehicle fleet after the end of the two-year period of maintenance supervision.

The training program will take place at intervals over at least 320 hours of actual training sessions. These sessions will include both classroom instructions as well as hands-on repair work in the depot maintenance area. Approximately 40 persons from the BRT Operator Company will be trained for the maintenance of each vehicle type.

5.3 Preventive Mechanical Maintenance

The schedule of preventive maintenance for each vehicle is a simple way to avoid operational problems and additional repair costs. During the preventive maintenance, the responsible professional can check for signs of wear and tear that can lead to future breakdowns or accidents and ensure that vehicles run safely and reliably. The level and frequency of preventive maintenance shall be determined considering bus supplier recommendations and operating conditions.

The creation of a checklist for the inspection of the major systems and items of the vehicles is the best practice to avoid skipping important maintenance tasks. The maintenance checklist must be unique for each vehicle type and shall include the checking of the following items:

- The major bus systems, such as fuel, auxiliary, braking, exhaust and others;
- The cabin controls;
- Tires and wheels;
- Level of all fluids;
- External and interior lights;

- Frame, undercarriage and drive shaft;
- All safety items, such as horn and seat belt.

5.4 Special Maintenance Procedures

In addition, it is recommended the establishment of special maintenance procedures to address the most common fleet problems that affect reliability such as electrical components failures and engine overheating. The special maintenance procedures aim to solve the most common fleet problems on a quickly way and avoid a great number of vehicles waiting for the maintenance services.

As special procedures, can be also included the most common minor repairs required for the buses of the system. The identification of the problems and repairs that require special procedures can be done based on monitoring information, as detailed forward.

5.5 Cleaning and Conservation

In the best-performing BRT systems, the internal cleaning of the vehicle occurs at the end of each journey and the external washing occurs at the end of the vehicle daily shift.

The internal cleaning includes the vacuuming of the vehicle and the removal of any materials, debris and dirt that may compromise the comfort of system users.

The external washing includes the removal of all external dirt of the vehicle. The vehicle wash aims to maintain the visibility through the windows and mirrors and the good appearance of the system with clean, well-maintained buses. The vehicle wash is directly correlated with the visual identity of the system and visibility of the brand in all vehicles.

5.6 Monitoring

Each vehicle must have a written record documenting all the maintenance history, such as preventive maintenances and repairs performed, within a minimum of the following information:

1. Identification of the vehicle, such as serial number, year, brand, model type and license plate number;
2. Date of each activity;
3. Mileage history.

The registration of all maintenance procedures can be used as a data set for cost indicators (cost per kilometre and cost per bus) and quality indicators (number of breakdowns). Other measure of the success of the maintenance program can be the number of unplanned/emergency repairs that have to be undertaken. The preventive mechanical maintenance shall keep these levels to the minimum. Without data, it is impossible to conclude whether the depots are spending more time and resources.

The supervisors of the process shall institute a series of random and periodic checks on repair/maintenance quality. Regular and surprise checks can reveal problems on the maintenance process, and the mechanics with higher than average repetition of problems can be trained to avoid more future problems.

The involvement of the drivers in the maintenance process can be useful and helps on the identification of any problem with the vehicle or with the infrastructure. The establishment of a communication link between drivers and the system management is an important aspect of the preventive maintenance. The drivers can identify any defects and report then to the maintenance supervisors through pre- and post-trip forms.

6. Recommendations for Operational Plan Implementation

As the new Karachi BRT system is a completely new transport service for Karachi, it is expected that it will take some time before the system is completely assimilated by the population as users are not are used to it.

6.1 Transition Time

This transition time can be divided into two phases of operation of the BRT system: the pilot phase and the full operation phase.

The **pilot phase** relates to user's behavior and can be understood as a period of adaptation of the population to something different from the usual. The more the new system differs from the current situation, the longer the pilot phase might take. The pilot phase starts with the start up of the BRT system and is expected to last from 1 to 2 years.

After this period, with the population adapted to the new transport system, it is expected that the demand of the BRT will be more stable, reflecting the fact that the system reached the **full operation phase**.

To guarantee the system success, it is desirable to attract as many people as possible to it, while still maintaining a high level of service. With this in mind, some actions can be taken aiming to shorten the pilot phase period, such as an implementation strategy considering the existing services fare structure and designing the BRT fare structure in a similar manner, thus minimizing any reluctance of the public transport users to adhere to the new system.

6.2 Implementation Strategy

A possible strategy for the BRT system implementation in Karachi can be:

1. First adopt an affordable fare structure for the start-up of the system, aiming to improve the population approval of the system during the pilot phase, and
2. At the same time, implement a package of actions aiming to increase the demand and the revenue of the system.
3. Once in full operation, the system would be in a better position to adopt a higher fare structure, which would reduce the required subsidy of the system

This implementation strategy is illustrated in the following figure.

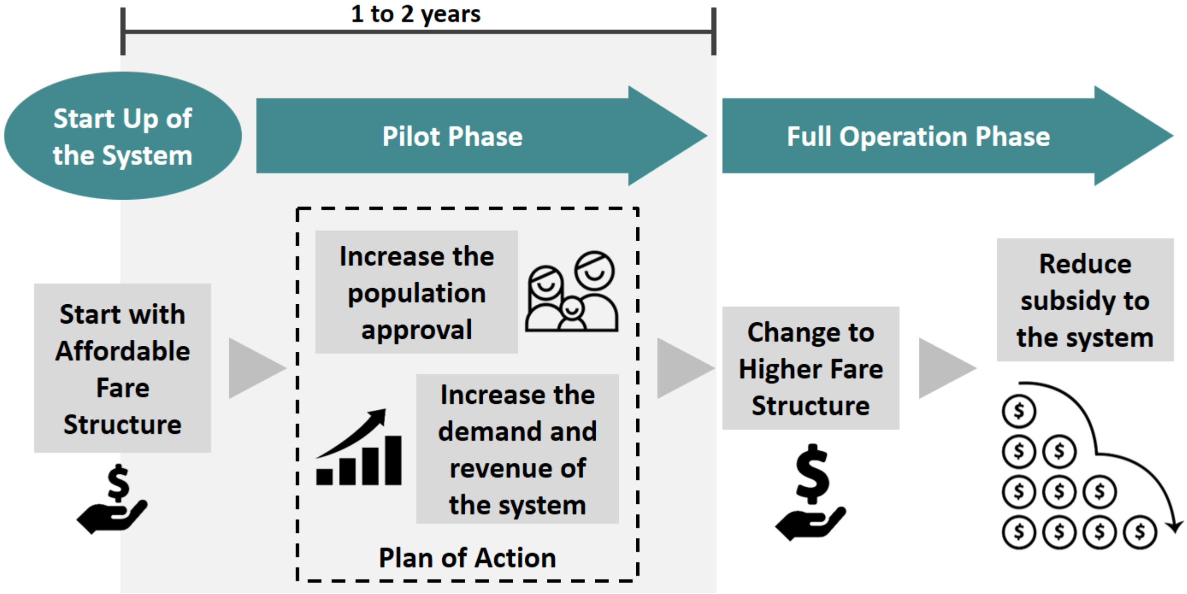

1 to 2 years
Start Up of the System
Pilot Phase
Full Operation Phase
Start with Affordable Fare Structure
Increase the population approval
Increase the demand and revenue of the system
Plan of Action
Change to Higher Fare Structure
Reduce subsidy to the system

Figure 6.1: Implementation strategy of the BRT system

6.3 Start with Affordable Fare Structure

The following figure shows the three Fare Structures considered for Karachi BRT Corridor on this study. It is noted that the **FS-10 (5km)** is the one that is closest to the current public transportation fare levels and it is, therefore, the **most recommended Fare Structure** to be adopted on the Start Up of the Karachi BRT system.

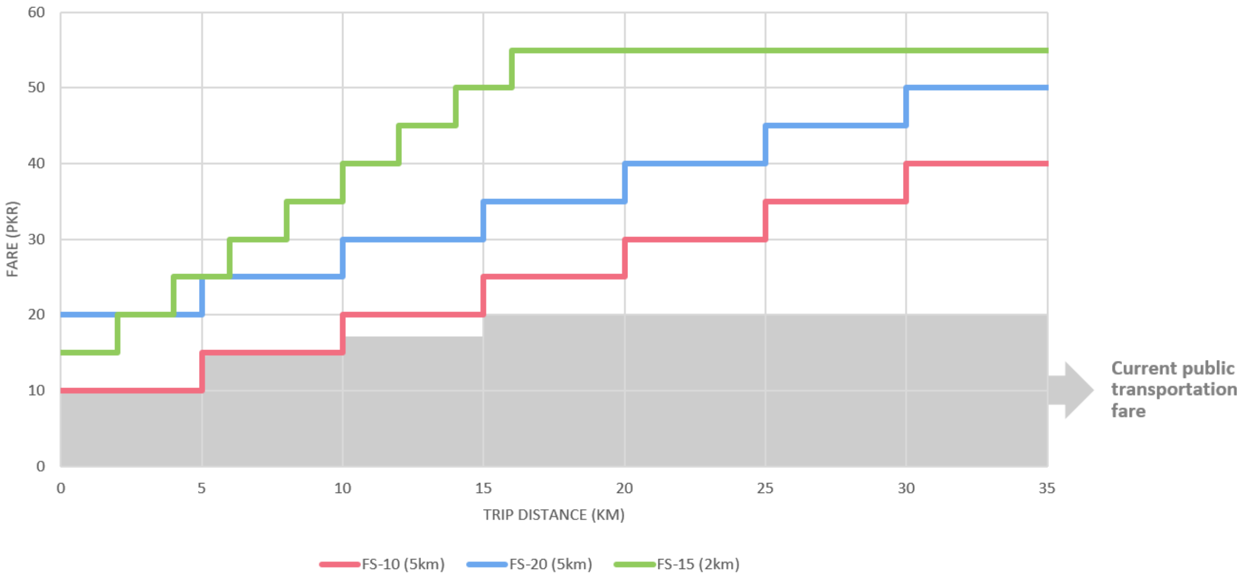


Figure 6.2: Fare Structures scenarios for modelling purposes

The implementation of a new urban system is a drastic change in the routine of the city's residents and therefore obstacles to success should be reduced to the maximum. The implementation of the system with a Fare Structure as close as possible of the current fare levels will increase the chances of the new system (and the government) to face less resistance from the population. That will facilitate the consolidation of Karachi BRT as a successful system.

The recommended Fare Structure (FS-10 – 5km) is more similar to the current fare structure considering the short trips. This feature have great importance in encouraging the use of the system, since shorter trips are generally less influenced by the painful transfers - required in the current system - or by the discomfort of travelling on substandard vehicles.

For longer journeys, the proposed Fare Structure is higher than the current one. This feature improves the financial result of the system, that is, it costs less to the government to maintain a system working with good quality. However, it is expected that for longer trips the reducing of the travel time, the reducing of the number of transfers and the significantly increasing of comfort inside the buses and stations will encourage the user to pay a higher fare, but not so high, without much resistance to the increase of the daily costs.

6.4 Complementary Plan of Action

Additionally, a package of actions (detailed below) could be implemented during the pilot phase in order to increase the demand and the revenue of the Karachi BRT system.

The following Figure 6.3 presents a scheme that qualitatively illustrates the demand behavior over time in the BRT considering (1) the different phases of operation and (2) the effect that a strategical package of actions could have on the demand. All values presented so far in this report consider the full system operation phase, without considering the effect of a package of actions that would promote greater demand levels on the system and possibly better financial results.

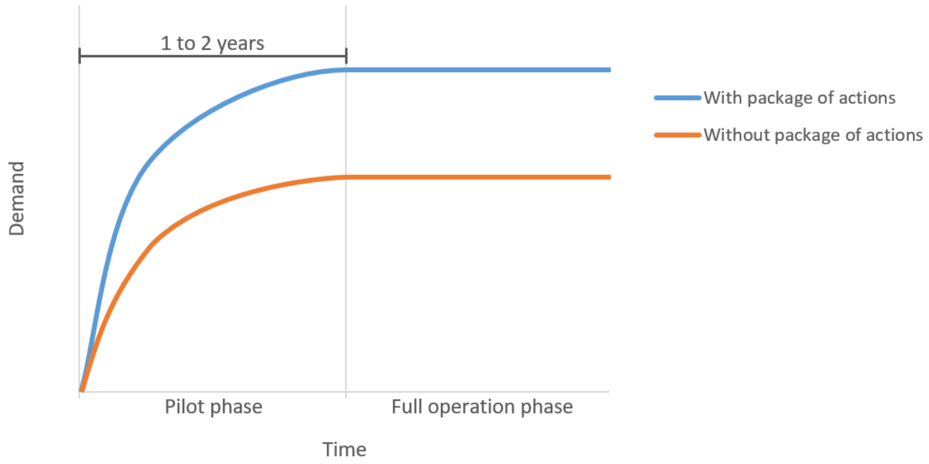


Figure 6.3: Demand of the BRT system for the pilot and full operation phases with and without the package of actions

The package of actions that seeks to increase the demand and the revenue of the system is composed of two main groups of actions:

1. Discourage the use of private transportation;
2. Increase the non-fare revenue.

To discourage the use of private transportation, efforts should be focused on motorcycle users, which are one of the main competitors of the BRT system. Some actions that can be taken are:

1. Charging high fares for parking on the streets
2. Reducing the number of parking spots on the streets
3. Increase taxes on the private parking areas
4. Limit the number of parking spaces in new construction near the BRT corridor
5. Increasing the taxes on fuel and
6. Incentivizing government employees to use the BRT system.

Finally, as a way of increasing non-fare revenue, the leasing of commercial spaces at stations could be expanded according to the increase of demand in strategical stations. Additionally, land value capture of the properties in the surroundings of the BRT infrastructure could be explored, as explained in more details in Appendix C of Interim Report 1.